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NOTE ON THE PROXIMATE PRINCIPLES OF SOME BERBERIDACEÆ AND RANUNCULACEÆ.

By Ferdinand F. Mayer.

Since the discovery of the yellow alkaloid Berberina in a new family, the fourth (Berberidaceæ, Menispermaceæ Anonaceæ, and Ranunculaceæ) and most extensive, it was to be presumed that other genera of these natural orders, especially those distinguished by rhizomes of a yellow color, would prove to owe the same to the presence of that alkaloid. In fact, some time after I began the examination, of which this is intended as a preliminary notice, I ascertained that my friend and colleague, J. M. Maisch, had intimated as much in regard to *Coptis trifolia*,* and that the Editor of this Journal had satisfied himself likewise on the same point; so that I can only confirm a prior statement.

There is present besides in the rhizome of the goldthread a colorless alkaloid, which, like Durand's hydrastia, is not precipitated by hydrochloric or nitric acids, and is separated in the same manner. For this as well as for several other colorless alkaloids, occurring in company with Berberina or otherwise in the families named, we must refrain from establishing new names until their relation to the other colorless alkaloids of the

*Buchner's Neues Repertorium f. Pharmacie, Band xi. July, 1863.

same families (Oxyacanthia, Pelosina, Menispermia) and to Hydrastia, has been defined.

From the late Jonathan Pereira's description of the root of *Coptis teeta** there remains little doubt but that the plants of this genus have a similar composition.

In *Berberis vulgaris* the yellow alkaloid was discovered by Brandes in 1825, but neither he nor Buchner and Herberger,† who gave the first analysis of the plant, noticed its true character. This was established by Buchner, Sr. and Jr.,‡ and afterwards by Fleitmann.§

Curiously enough, the same volume (iii.) of the Journal of the Philadelphia College of Pharmacy, in which is noticed the essay of Buchner and Herberger, and also the discovery of columbine in the root of *Cocculus palmatus* (Nat. Order Menispermaceæ), by Wittstock, contains a paper on an American Berberidacea, the *Podophyllum peltatum*, in which a bitter principle is described, which from the few data given by the author, Mr. William Hodgson, Jr., could only have been the yellow alkaloid of that family.

This substance, which received the name of *podophylline*, was obtained by the same process by which berberina is still extracted from the vegetables containing it, *i. e.*, by decoction in water and purification of the extract with alcohol. It was not freed from adhering brown resin, nor was its character as alkaloid noticed; but its bitterness, its solubility in cold water and precipitation by hydrochloric acid, were mentioned by Mr. Hodgson.

The rhizome of the May-apple contains both berberina and a colorless alkaloid, a resin, a free acid, a neutral odorous substance volatilizable in white scales, and *saponin*.

When the alcoholic extract of the rhizome is freed from alcohol and then mixed with water, the latter dissolves the acid, a

*Pharm. Journ. Trans. xi. 294.
Mishmee teeta, Mahmira, probably the same as mentioned by Paulus Ægineta, Actuarius, Avicenna, Rhazes, Ibn Baitar; *Chynlen* (Guibourt, *Histoire Naturelle des Drogues simples.*)

†Buchner's Repert. xxxvi. p. 1 (1830).—Journ. Phila. Coll. iii. p. 173.

‡Buchner's Repert. lii. p. 1, xciv. 176. Ann. Chem. Pharm. xxiv. p. 228.

§Ann. Chem. Pharm. lix. p. 160.

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considerable quantity of berberina, and saponin, together with some resinous matter. The precipitate left after washing with water, the so-called resinoid *podophyllin*, is a mixture of a resin and the volatile principle, which are soluble in ether, and a portion soluble in alcohol, which is the other alkaloid in combination with saponin and brown resinous matter.

The wash-water or supernatant liquid from the precipitation of the impure resinoid contains berberina and saponin, besides free acid. The alkaloid can be precipitated by lead or by acids. When the liquid is reduced to the consistence of a thin syrup, and on cooling mixed with water, impure saponin is precipitated in considerable quantity.

The rhizome of another plant belonging to this family and used in Eclectic practice, *Jeffersonia diphylla*, twin-leaf, contains a small quantity of berberina, a larger proportion of a white alkaloid, and a considerable amount of saponin. The presence of alkaloids in this plant is indicated by the reactions obtained by Mr. Bentley,* in the aqueous decoction with iodine, tannic acid and corrosive sublimate.

Mr. E. S. Wayne, who has examined this plant,† mentions a bitter principle and an acrid acid. The pectin found by him is saponin. It forms a still larger proportion of the soluble constituents of the rhizome of *Leontice* or *Caulophyllum thalictroides*, Blue Cohosh.

The alcoholic tincture of this rhizome left to spontaneous evaporation, deposits a white granular substance in considerable quantity. No berberina is present, only a yellow coloring matter. The deposit washed with dilute acid, which dissolves a colorless alkaloid and soluble extractive, and then with some water, remains as a grayish white powder, which, for the greater part, consists of *saponin;* and this, together with a portion of the alkaloid, constitutes the so-called caulophyllin of Eclectic pharmacy.

These are not the first plants of the order of Berberidaceæ, in which saponin has been found. The *Leontice leontopetalon*, Linn., known to be used in the Orient for washing, etc., is men-

*Pharm. Journal and Trans. (2) iv. p. 106.

†Am. J. Pharmacy, vol. xxvii. p. 1.

tioned by Th. Martius,* among the plants containing that principle.

Its presence in these American plants will account for some of the acrid properties ascribed to their preparations.

[I have been favored by Dr. C. H. Cleaveland, of Cincinnati, with a very handsome collection of active preparations used by the Eclectic school, and I have availed myself quite extensively of the Doctor's information in regard to them. I have also to acknowledge the receipt of a fine set of duplicates of the alkaloids, which the giver, Mr. W. S. Merrell, of Cincinnati, had on exhibition at the meeting of the American Pharmaceutical Association in August last. As to the question of priority of discovery, which Mr. M. claims for the two alkaloids of *Hydrastis Canadensis*, I must leave that undecided, but cannot adopt the name by which he designates the yellow alkaloid. *Xanthin* or *Xanthia* would be quite appropriate when applied to a yellow colored principle; but for that very reason it has been a tempting title to others before. First, Liebig and Woehler applied it to the yellow base discovered by Marcet in 1819 in certain concretions of the bladder, and since found by Strecker and Scheerer to be a normal constituent of the animal body. Then, Unger used it for some time for the base of guano; next the name was applied by Higgins to the yellowish glucoside of madder, the same which Schunck calls *rubian*, and which in all probability is impure ruberythric acid. Lastly, Fremy and Cloez, in their essay on the coloring matters of flowers, have distinguished a yellow principle insoluble in water, which they style Xanthin, and a soluble one, Xanthein. There is really no cogent reason for any change in the name of the yellow alkaloid of the Berberidaceæ and cognate families, none half as good as there would be in substituting benzidam for anilin.]

New York, February, 1863.

CLEMENS' SOLUTION OF BROMO-ARSENIATE OF POTASSA.

This solution is made (*Druggists' Circular*) as follows:—

Take of Glacial Arsenious Acid in powder,

Carbonate of Potassa, of each a drachm,

Dissolve them in half a pint of water by heat, dilute the solution to 12 fluidounces, in a stoppered bottle, add two drachms of Bromine and digest at a gentle heat till a colorless solution is obtained.

Dose: 3 or 4 drops once or twice a day.

*Buchner's Neues Repert. vol. xi., August and Sept., 1862.

CHEMICAL EXAMINATION OF COMMERCIAL CHLORIDE OF PROPYLAMINA.

By Wm. T. Wenzell.

On examination of a specimen of Chloride of Propylamina made by one of our best manufacturing chemists, by the microscope, it was found to consist of well crystallized arborescent hexagonal prisms. On mixing its aqueous solution with one of bichloride of platinum in excess, it gave, after half an hour's repose, the yellow octohedral crystals of $NH_4Cl+PtCl_2$. The filtrate from the ammonia salt was evaporated to dryness, adding more bichloride of platinum, so as to keep it in excess. During the evaporation, which was conducted on a water bath, quite a quantity of a yellow crystalline precipitate subsided. The dried mass was treated with etherized alcohol, thrown on a filter and washed. The washed platina salt was carefully dried at a temperature of 180° Fahr., transferred to a small porcelain crucible and weighed. The nett weight found was 3·37 grains. After ignition it gave 1·24 grs. platinum. Chloride of Propylamina ($NH_3(C_6H_6)Cl+PtCl_2$) should give 37·08 of platinum; the amount here found is 36·79, which is sufficiently near to identify the Propylamina. The filtrate obtained after the separation of the propylamina salt was necessarily allowed to stand over night, and found much darkened from reduced platinum. It was, therefore, evaporated to dryness, dissolved in water filtered to separate the reduced metal, again evaporated, and finally dissolved 60 per cent. alcohol; the residue not being altogether soluble in 95 per cent. alcohol. The filtrate on spontaneous evaporation was found to deposit transparent, colorless slender prisms insoluble in absolute alcohol and ether. The crystals on ignition left metallic platinum, thereby showing the existence of a double salt of an amine base and platinum. Want of time has forced me to lay this subject aside for future investigation. The percentage of hydrochlorate of ammonia contained in the chloride of propylamina under examination, I have quantitatively estimated at ·027 per cent. by means of phosphate of soda and sulphate of magnesia.

La Crosse, Winsconsin, January, 1863.

HISTORY OF THE ORGANIC RADICALS.

By M. Auguste Cahours.

A Lecture delivered before the Chemical Society of Paris, March 30th, 1862.

Translated from the French, by W. S. W. Ruschenberger, M. D., U. S. N.

(Continued from page 12.)

Some chemists, with Ampere, admit into these compounds the existence of the radical

$$AzH^4,$$

designated under the name of ammonium, [NH^4] a radical which has not yet been isolated notwithstanding all the efforts which have been made, and, it would be at a risk of being illogical, to admit its formation by contact of chlorohydric acid with ammonia, the tendency of the latter to unite with hydrogen being so feeble as not to be sufficient to overcome the powerful affinity of chlorine for this gas. We know that when we cause the amalgam of potassium to act on a concentrated solution of an ammoniacal salt, with the view of obtaining the amalgam in which is admitted the existence of the compound

$$AzH^4$$

this is spontaneously destroyed, although its union with mercury tends to give it stability. It cannot be supposed more reasonably, that the affinity of chlorine for the compound, which tends to be produced, may be susceptible of determining its formation; for it is enough to cause chlorine to act on a solution of chlorohydrate of ammonia, by aid of a gentle heat, to see the compound resolve itself entirely into azote [nitrogen], which is disengaged in a gaseous form, and chlorohydric acid which remains dissolved. Is it then not more simple and more logical to admit that the union of two bodies placed in contact, begets a particular group which is referred to the type

$$AzX^5,$$

which appears to be the term of saturation of the compounds which azote [nitrogen] is susceptible of forming?

The same is true in regard to the derivatives from ammonia known under the name of trimethyliac, triethyliac, triamyliac, &c., which are formed, as we know, by the substitution of three molecules of methyl, ethyl, or amyl, for the three molecules of

hydrogen which it contains; these compounds which may be represented by the symbols

$$AzMe^3\ AzE^3\ Az\ Amy^3$$

may fix either

$$HCl \text{ or its analogues}$$

or $$MeCl\ ECl\ AmyCl$$

to form compounds of the same order,

$$Az\ (Me^4Cl)\ Az\ (E^4Cl)$$

in which we must admit, without more serious reasons, the existence of new radicals derived from ammonium, radicals which it has been as impossible up to this time to isolate as ammonium itself. There is certainly nothing improbable in supposing that we may obtain a compound formed of one equivalent of azote and four equivalents of hydrogen, but the mind refuses to admit that a like compound can arise from the contact of chlorohydric, bromohydric acids, &c., while we know the considerable affinity which the constituent principles of these gases have for each other, and the enormous resistance they offer to decomposition. Is it not much more simple to admit that azote as well as its congeners is susceptible of forming divers combinations of which the term of saturation is of the form

$$RX^5.$$

As long as this limit is not obtained, we may add to the product under consideration, one or more equivalents of the same substance or of different substances, until we have reached it. The inferior term which is considered to play the part of fixing certain bodies to form definite compounds, could it be separated intact from these compounds by the intervention of reagents or forces purely physical, would present the properties which characterize simple bodies.

There is certainly between the ammoniacal compounds and those which the alkaline metals form, analogies well worthy of serious study; but it must, however, be confessed, they are found more in the form than in the substance, which does not constitute a sufficient reason for assimilating them with each other.

Proceeding from azote towards arsenic we observe in corresponding compounds quite curious differences, on which I desire in a few words to fix your attention.

Ammonia, in exchanging all its hydrogen for the groups methyl, ethyl, propyl, amyl, &c., gives rise to the compounds

$$AzMe^3\ AzE^3\ AzPr^3\ Az\ Amy^3,$$

which may slightly enter into the formula which constitutes the term of saturation by the fixation of a molecule of chlorohydric, bromohydric acid, &c., after the manner of ammonia, but which are incapable of uniting with two molecules of oxygen, of chlorine, or of sulphur, to form analogous compounds, which shows that these products are wanting in the characters of radicals.

The corresponding compounds

$$PhMe^3\ PhE^3,\ \&c.,$$

like the preceding, have the property of uniting with acids, and also of fixing $O^2Cl^2S^2$, in the manner of simple bodies.

Their analogues of the arsenic series,

$$AsMe^3\ AsE^3\ \&c.,$$

incapable of uniting with acids, fix with the greatest facility $O^2Cl^2S^2$, &c. So that phosphorus serves in some way as the transition between the compounds of nitrogen and the corresponding products formed by arsenic.

We have seen above, that among simple bodies there is a certain number which are susceptible of forming with methyl, ethyl, &c., compounds corresponding to oxides, chlorides, &c., in which oxygen or chlorine would be replaced by equivalent quantities of preceding groups. The numerous researches undertaken by M. Frankland with the view of isolating the alcoholic radicals have made us acquainted with two very remarkable compounds—the methyluret and ethyluret of zinc, belonging to the group

$$ZnX,$$

which have become a source of reactions full of interest. The most recent labors of M. Vanklyn in like manner have taught us that the alkaline metals may form analogous compounds; only these latter are so unstable, that, up to the present time, we have been unable to separate them from the compound which they form with the methyluret or ethyluret of zinc.

Left in contact with oxygen, these products absorb this gas with great avidity. The latter, far from uniting with the ternary group, brings complete destruction to the molecule by burning the elements which compose it; hence the inflammation

of the substance. In presence of water these liquids induce its immediate decomposition, producing metallic oxides, and hydride of methyl or of ethyl, a result easy to understand if we reflect that these different products represent compounds at saturation, containing elements endowed with energetic affinities for the constituent principles of this liquid, and consequently very apt to cause its destruction in decomposing themselves. The ethyluret of zinc, no more than the alkaline ethylurets, can act as a simple body, since it represents the most stable group which these metals are capable of forming, and consequently the name of *organo-metallic* radicals, by which they have been designated, is entirely inexact.

When we replace the zinc by the metals of diverse sections, we obtain in some cases entirely analogous reactions.

Under certain circumstances free ethylurets are formed, as in the case of magnesium; in others, and especially with tin, we obtain perfectly definite iodides.

A close examination of these interesting products, the study of their metamorphoses, and the circumstances of their production, have led me to consider all those which act in the manner of simple bodies, as not having attained the limit of saturation. This I propose to demonstrate to you now, abandoning the domain of hypotheses to enter into that of facts.

Magnesium, like zinc, which it resembles in so many respects, appearing susceptible of forming but a single group of the form

$$MgX,$$

should evidently form by its union with methyl and ethyl only one combination. Experiment fully realized my expectatoins.

When filings of magnesium are placed in contact with the iodides of ethyl or methyl, a quite vivid reaction is manifested, and the mixture becomes strongly heated. If, after having mastered it by affusions of cold water, we introduce it into tubes sealed by a lamp, then maintain it during several hours between 120° and 130° [centigrade], we finally obtain a white mass which is resolved by distillation into several products. In effecting this operation in an atmosphere of hydrogen, we collect in the recipient a mixture of iodide of ethyl or of methyl, and a very volatile liquid possessing an aliaceous odor, which takes

fire in the air, and with violence decomposes water upon which it may be projected; the residue consists of iodide of magnesium. A new rectification made on the raw product permits the separation of the inflammable liquid from the iodides of methyl or of ethyl unaltered.

Analysis of these products, their manner of acting in respect to free oxygen and water, their manifest analogies to the zinc methyl and the zinc ethyl, leads us to represent them by the formulæ

$$Mg\ (C^2H^3) \text{ and } Mg\ (C^4H^5).$$

In the reciprocal action of magnesium and the iodides of ethyl and of methyl, there is produced an abundance of gases which, in the case of the ethylic compound, consist of

$$C^8H^{10}\ C^4H^4 \text{ and } C^4H^6.$$

With the iodide of methyl we obtain the products

$$C^4H^6 \text{ and } C^2H^4.$$

The action of magnesium upon the iodides of ethyl and of methyl is entirely comparable to that which zinc exercises upon these compounds.

The ethylurets and methylurets which arise in this contact, correspond to the group

$$MgX,$$

the only stable one which magnesium can form. We conceive therefore that these compounds, like the ethylurets and methylurets of zinc, are incapable of forming new combinations by assimilating one or several molecules of certain simple bodies, the latter being able only to induce the destruction of these compounds, to give rise to new groups which possess a more stable equilibrium.

Aluminium while cold exerts no action upon the iodide of ethyl; at 100° [centigrade], the attack is very manifest; in maintaining the mixture during twenty-four hours at 130° in hermetically sealed tubes, the reaction is complete. If the ethylic iodide be used in slight excess, the metal entirely disappears, and we find in the tubes a thick, brownish liquid, which gives off to the air abundant fumes. In distilling the contents of the tubes in an apparatus filled with hydrogen, we collect in the recipient a light amber-colored liquid, the disagreeable and penetrating odor of which recalls that of altered turpentine.

This liquid fumes strongly in the air, and inflames when projected into an atmosphere of oxygen or chlorine, disengaging violet vapors. It decomposes water in a sudden manner with a true explosion, producing alumina and iodohydric acid; it disengages at the same time an inflammable gas which burns with a pale blue flame.

This compound, which boils at about 350°, contains both aluminium and iodine, as well as carbon and hydrogen, in the proportions which constitute ethyl.

Numerous analyses of this product, and the decomposition which it undergoes with water, lead to the following formula:

$$C^{12}H^{15}\,Al^{4}\,I^{3} = Al^{2}\,I^{3},\,Al^{2}\,(C^{4}H^{5})^{3},$$

which would make of it a compound of one equivalent of the iodide of aluminium with the corresponding ethyluret.

The zinc ethyl attacks it briskly, producing a very inflammable volatile liquid, which appears to be aluminethyl.

The iodide of methyl behaves towards aluminium in the same manner as the iodide of ethyl. As in the preceding case, we obtain a volatile liquid at a high temperature, burning in the air, and decomposing water suddenly, giving rise to hydruret of methyl (gas of marshes). The composition of this product, which contains at once aluminium, iodine and the elements of methyl, may be represented by the formula

$$C^{6}H^{3}Al^{1}I^{3} = Al^{2}I^{3},Al^{2}(C^{2}H^{3})^{3}.$$

Glucinium strongly attacks iodide of ethyl when heated with this liquid in hermetically sealed tubes. We then obtain, as with magnesium, a solid product, which distillation separates into iodide of glucinium, and an odorous volatile liquid possessing the property of decomposing water suddenly after the manner of the preceding substances, disengaging an inflammable gas. The behaviour of this liquid towards water seems to indicate that it is of a nature analogous to that of the compounds furnished by magnesium and aluminium. The very small quantity of glucinium at my disposal did not permit me to establish its constitution by analysis.

Iron attacks iodide of ethyl briskly, at about 175° to 180° [centigrade]; gases are produced abundantly, and we obtain an iodide of iron, but I have not been able to obtain in this reaction any definite ethyl compound.

Chrome even at 200° does not appear to react in any manner upon iodide of ethyl. It is the same with molybdenum and titanium.

Metallic tin in the form of leaves is rapidly attacked by iodohydric ether, when we maintain these bodies enclosed in hermetically sealed tubes during several hours at a temperature of from 140° to 150°. The reaction is effected even in a bath of boiling water, but in this case a much longer time is required. It is also effected at an ordinary temperature, as was ascertained by M. Frankland, by the intervention of solar radiation.

If care is taken to employ from two to two and a half parts by weight of the iodide of ethyl for one part of tin, the metal disappears entirely, and if the substances are pure and very dry, the tubes contain a solid white mass formed of long intercrossed needles which are soiled by a small quantity of yellow or brownish oil which colors them. When we break the point of the tubes, most commonly there is no trace of gas disengaged. The crystals are easily purified by drying, compressing them between folds of bibulous paper, dissolving them in alcohol and abandoning the liquor to spontaneous evaporation. Finally, we obtain after one or two crystallizations fine colorless prisms, having considerable lustre and entirely free from odor. The oil which soils the crystals, whose pungent, insupportable odor recalls that of horseradish and mustard, is a mixture of the iodide of ethyl which has taken no part in the reaction with the iodide of a ternary compound containing carbon, hydrogen and tin. Under some circumstances we find in the tubes also a small quantity of a red crystalline powder which is iodide of tin.

The prismatic crystals brought to a state of purity, melt at 42° into a very limpid colorless liquid, which usually boils between 245° and 246°, and distils without alteration.

Alcohol dissolves them in large proportion, particularly when hot.

Ether readily dissolves them even when cold.

Little soluble in cold water, they are dissolved in notable proportion when at the boiling temperature.

Rectified wood spirit dissolves them like alcohol.

An alcoholic solution of these crystals is immediately decomposed by sulphate, nitrate, acetate, and butyrate of silver, form-

ing insoluble iodide of silver and corresponding salts which crystallize readily by the evaporation of alcoholic distillation.

Analysis of these crystals leads to the formula

$$SnC^4H^5I.$$

The behaviour of this product with reagents leads us to regard it as an iodide of a ternary compound formed of one molecule of tin and a molecule of ethyl, or as corresponding with the group

$$SnX^2,$$

which represents the limit of saturation of the compounds of tin.

Their very simple formation is explained by means of the equation

$$Sn+C^4H^5I=SnC^4H^5I.$$

In considering the group

$$SnC^4H^5$$

as a radical, the preceding compound would become an iodide entirely comparable to metallic iodides, the radical moreover being susceptible of separation from the combination by the intervention of metals more electro-positive than tin.

The caustic alkalis, potassa, soda, ammonia, cause in a solution of the preceding compound a white, flocculent, amorphous precipitate, insoluble in an excess of these reagents. This product, which does not differ from the preceding, except that the molecule of iodine is replaced by a molecule of oxygen, would be an oxide of this radical, which we will designate under the name of *stannethyl;* henceforward we shall represent its composition by the formula

$$SnC^4H^5O.$$

This compound unites directly with acids, saturates the most energetic, and forms salts which, whenever they are soluble, crystallize with the greatest ease. Their composition is expressed by the general formula

$$A,SnC^4H^5O.$$

The hydracids behave with it as with metallic oxides, the hydrogen seizing upon its oxygen to form water, while the radical of the hydracid goes to the stannethyl group to form a definite compound,

$$SnC^4H^5O+RH=HO+SnC^4H^5R.$$

(To be continued.)

PHARMACEUTICAL NOTICES.

By William Procter, Jr.

The following remarks are offered to the reader as mere laboratory notes, which may aid him in reference to some of the preparations to which they allude.

Ferri Sesquichloridum.—It has become usual for physicians to prescribe the solid perchloride of iron in solution, or in a syrup which is most easily prepared from the solid salt if it is entirely soluble. In order to possess this quality of solubility, and at the same time to be not too deliquescent; the chloride must be the crystallized hydrate with twelve equivalents of water, which has been adopted into the Pharmacopœia of 1860. The process which was found most eligible is to make a protochloride, and convert it into sesquichloride with nitric acid, as recommended by Wittstein and others. The chief difficulty in the process is in determining the point at which the evaporation should be stopped, which is best done by tareing the capsule and stopping when the solution weighs 4¼ times that of the iron dissolved. The following is a sketch of the recipe:

Take of Iron wire (card teeth), three ounces, *troy*.
Muriatic acid (sp. gr. 1·16), eighteen ounces, *troy*.
Nitric acid (sp. gr. 1·42), a sufficient quantity, or about three troy ounces and a half.

Add the iron to twelve ounces of the acid in a quart flask, and apply a moderate heat until the acid is saturated and effervescence ceases. Filter the solution, mix with it the remainder of the muriatic acid; and having heated the mixture nearly to the boiling point, add the nitric acid in successive portions until red fumes cease to be evolved, and a drop of the liquid in a test glass affords no blue coloration, or precipitate with solution of red prussiate of potassa. Transfer the liquid to a smaller tared capsule, heated by a water bath, and evaporate it with frequent stirring until the weight of the solution is about twelve ounces and a half troy. Then set the capsule to cool, cover it with a bell-glass and leave it for two or three days, until the whole becomes a solid crystalline mass. The chloride should be then broken up and preserved in closely stopped vials.

Liquor Ferri Nitratis.—It will be remembered that the original formula for this solution by Kerr, produced a dark colored liquid, and very prone to deposit sesquioxide of iron. On two previous occasions the writer made suggestions to remedy this physical inconvenience, rendering the preparation a solution of the ternitrate, and in that form it is now in the Pharmacopœia, yet in two instances he has been told by physicians that they do not get the therapeutic effects from the new solution that appertained to the original. In reflecting on this statement, it has occurred to me, that the relationship between these two preparations is analogous to that between Monsel's solution and the solution of tersulphate of iron. Now it is well known that whilst the latter is sharply acid and almost caustic to the taste, and on an abraded surface, the former is mainly astringent, and may be applied to cut surfaces without much inconvenience. May not the old solution of nitrate of iron, owing to the greater proportion of oxide of iron present in it, and its weaker acid properties, possess more astringency and be more effective in chronic diarrhœa, etc., than the solution of ternitrate? The idea is thrown out to physicians that they may, by trial, decide the question of merit between them, if so disposed.

Extractum Rosæ Fluidum.—This preparation will be found a convenience for preparing the honey of roses as recommended by Graham, as well as for the syrup of roses, and for the compound infusion, both of which can be made from it extemporaneously.

Take of Red rose leaves, sixteen ounces, troy.

Diluted alcohol, (deodorized) a sufficient quantity.

Carefully dry the roses, pulverize and pass them through a seive No. 60, moisten the powder with six fluidounces of diluted alcohol, pack it firmly in a funnel, cover it with a piece of muslin and pour on diluted alcohol until twelve fluidounces pass. Set this aside, and continue the percolation until a pint and a half more of liquid is obtained. Evaporate the latter at 120° F., in a porcelain dish, to four fluid ounces, and mix it with the reserved fluid. To make the honey of roses, add two fluidounces to eighteen fluidounces of good thick clarified honey. To make the syrup, add a fluidounce of the fluid extract, to fifteen fluid-

ounces of simple syrup, and mix them. To make the Compound Infusion of Roses, add two fluid drachms of the fluid extract to a pint of water, previously mixed with a fluid drachm of diluted sulphuric acid.

Extractum Cocculi Fluidum.—Being called upon to prepare a fluid extract of cocculus indicus, with a view to its use for the destruction of personal vermin, the following formula was adopted:

Take of Cocculus Indicus, sixteen ounces, troy.
Alcohol and water, of each a sufficient quantity.

Bruise and sift the cocculus, using a number 40 seive, until the kernels have passed the seive and the capsules have been well broken up. Moisten the powder with six ounces of a mixture of two parts of alcohol and one of water, and after standing two hours pack it in a conical percolator, and pour on the same menstruum, until twelve fluid ounces have passed. Digest the capsules in two pints of diluted alcohol for several hours at 130°, and after cooling, pour the whole into the percolator on the kernels. When the liquid disappears, pour on diluted alcohol, until two pints more of percolate is obtained. Evaporate this to four fluidounces, mix it with the reserved tincture, and after standing twenty-four hours filter through paper.

Extractum Leptandræ Fluidum.—Several years ago, Mr. S. Campbell published a formula for this preparation, (vol. vi. 3d series, 225) of the strength of half an ounce to the fluidounce, in which carbonate of potassa was introduced with the view of dissolving the resinoid constituents which it was presumed could not be held in solution in the ordinary manner, although the menstruum was strongly alcoholic. After some study of this preparation, it is proposed to make this fluid extract of the full strength, and to omit the carbonate of potassa, mixing a portion of sugar, and retaining part of the alcohol. The formula in the Eclectic Dispensatory (page 1096, edit. 1859,) yields a good fluid extract, but involves too much evaporation and requires three distinct operations.

Take of Leptandra root, in powder, (No. 60 seive,) sixteen ounces, troy.
Sugar, four ounces.
Alcohol and water, of each a sufficient quantity.

Mix a pint of alcohol with half a pint of water, and moisten the powder with three fluidounces of the mixture, pack it in a glass percolator and pour on the remainder of the menstruum. Continue the percolation with diluted alcohol until a pint of tincture has passed. Set this aside in a warm place, that it may be reduced to half a pint by evaporation, and continue the process until three pints more of tincture have slowly passed. Evaporate this on a water bath, to a pint add the sugar, and again evaporate till reduced to half a pint, and whilst yet hot mix it with the reserved evaporated tincture, so as to get a pint of fluid extract.

The direction towards the liver attributed to Leptandra, has caused it to gain considerable reputation as a cholagogue, and no preparation of it is more efficient than the fluid extract when well made.

Extractum Cascarillæ Fluidum.

Take of Cascarilla, in fine powder, (No. 60 seive,) sixteen ounces.

Alcohol and water, of each a sufficient quantity.

Mix twelve fluidounces of alcohol with four fluidounces of water, and moisten the powder with six fluidounces of the mixture, pack it in a glass funnel, and having covered it with a piece of muslin, pour on the remainder of the menstruum. When this has disappeared from the surface, pour on diluted alcohol until twelve fluidounces of tincture has passed. Set this aside, and proceed with the percolation until two pints more of liquid has passed. Evaporate this on a water bath at a moderate heat, to four fluidounces, add it to the reserved tincture, and after thoroughly agitating the mixture, allow it to stand until clear; decant the clear liquid, throw the remainder with the dregs on a filter, and add, finally, sufficient diluted alcohol to make the fluid extract measure a pint.

Extractum Cocci Fluidum.—This preparation is suggested merely for the convenience of the apothecary, either for dispensing in prescriptions, or as a coloring agent. The common cochineal mixture of ten grains of cochineal, and twenty grains of carbonate of potassa, which at seasons is so frequently called for, may be made extemporaneously by putting the carbon-

ate into the vial with the water, and adding twenty minims of the fluid extract. To guard it against decomposition the fluid extract is made partly alcoholic.

Take of Cochineal, four ounces, (troy.)
Diluted alcohol, a sufficient quantity.

Powder the cochineal to the fineness of a sieve of fifty meshes per inch, mix it with its bulk of fine sand, moisten it with half a fluid ounce of diluted alcohol, press it slightly in a funnel prepared for percolation and pour on diluted alcohol so that it shall slowly pass. Reserve the first five fluidounces, and continue the percolation until a pint more of tincture is obtained. Evaporate this at a temperature below 130° on a water bath, in a porcelain dish, to three fluidounces. Lastly, mix it with the reserved tincture and strain if necessary. Each minim represents half a grain of cochineal.

On Lard and Simple Ointment.—During the past twelve months the pages of the *Journal de Pharmacie et de Chimie* have been the vehicle of a series of reports on Pharmaceutical preparations, with a view to the pending revision of the Codex, which are remarkably detailed, and embrace a much larger list of preparations than will probably be adopted in that work. The November number contains the report of MM. Vuaflart, Durozier & Comar, on cerates and ointments.

Lard.—In the preparation of lard for Pharmaceutical purposes, the crude fat should be carefully separated from the membranes and pieces of flesh, cut in small pieces, and then malaxated in repeated portions of cold water until this remains clear, when it should be tried in a tinned vessel with a moderated heat until the melted fat which at first is milky from the presence of water, becomes perfectly clear and anhydrous. It should then be strained into earthen pots, stirred occasionally till it chills, (but not so as to incorporate any air with it,) to prevent granulations of a stearic nature from forming. The pots should then be securely covered, (waxed or varnished paper will be suitable,) and kept in a dry, cool cellar. Veal, beef, and mutton suet should be prepared in the same mannér.

Benzoinated and Populinated Lard.—However carefully prepared, lard tends to get rancid by age and exposure. In 1843

and 1849, M. Deschamps broached the idea of its being protected by certain balsamic resins, and suggested *benzoinated* and *populinated* as prefixes, denoting that the lard had been digested with benzoin and poplar buds. I have tried both of these means of retarding the oxidation of fat, and find the latter far superior in its power for this purpose. In 1851 a sample of red oxide of mercury ointment was prepared with poplar-bud ointment, and presented to the class of the Philadelphia College of Pharmacy, and I had occasion this year exhibit to the same specimen, which continues free from any visible evidence of deoxidized mercury, and retains its peculiar odor, though twelve years have elapsed. The objection to this agent is that it colors lard and ointments orange yellow. I have used it advantageously in mezereum and other colored ointments, and for beef marrow, which it odorizes. This is the period of the year when the buds of Populus balsamea should be procured. *Balsam of Peru* incorporated or heated with lard possesses the same quality.

Balsamic Lard.—The report to which we have alluded contains the following formula:

Take of Lard, newly rendered, 1000 grammes.
Balsam of Tolu, 10 "

Mix them and liquify the lard in an earthen vessel by aid of a water bath, digest for some time and strain through muslin. The lard should be stirred during the cooling to prevent granulation. Balsamic lard as thus prepared is perfectly white and of an agreeable tolu odor. The Reporters recommend in making *mercurial ointment* to employ 460 parts of balsamic lard and 60 parts of wax melted together as the vehicle for 500 parts of mercury; using the fatty matter in a semifluid state by agitation, a plan of proceeding well-known in this county, and used by Mr. Coppuck and Dr. Squibb. Thus made, mercurial ointment is free from rancidity and of an agreeable odor. The authors recommend balsamic lard as a vehicle for narcotic ointments, from extracts, and for those of sulphur, the iodides of lead, and of mercury, and of tartar emetic.

Elemi in Ointments.—The resinous matter of elemi, or at least one of its resins, is peculiar in its relations to the oils and fats, and is often the occasion of difficulty. In making the

unguentum elemi of the London Pharmacopœia, the elemi and turpentine should be first liquified by heat and strained if necessary, and then the suet and oil previously melted is incorporated by active stirring. The tendency is for a portion of resin to be precipitated by the fats and become unmanageable. The Dublin Pharmacopœia requires 4 ounces of elemi fused, to be incorporated by fusion with 16 ounces of white wax ointment.

Recently the following prescription was dispensed:

Take of Tolu, two drachms, troy.
Elemi, half an ounce, "
White Wax, an ounce, "
Lard, an ounce and a half, "
Powdered Camphor, six drachms, " Mix.

No directions were given for the preparation. The tolu and elemi were first softened by heat, the camphor then added, which soon formed a liquid mixture; the wax was then added, which also incorporated with the others; but when the lard was finally added, a portion of the resinous matter was precipitated, amounting to one-sixth of the whole, which refused to unite with the fluid portion. The latter on straining formed an elegant ointment.

Mouchon's Colocynthin.—In this Journal, March, 1862, page 138, the writer gave a notice of several substances which had been used under the name of colocynthin. Since that time he has had occasion to prepare some of the so-called colocynthin, and employed the following recipe and manipulation.

Take of Colocynth pulp. (deprived of the seeds,) thirty-two ounces.
Animal Charcoal (of good quality, unpurified,) thirty-two ounces.
Alcohol sp. gr. 835, a sufficient quantity.

Dry the pulp at a moderate temperature until friable, and reduce it to powder by passing through a No. 40 sieve. The animal charcoal should also be in powder of the same fineness. Close the neck of a two gallon glass funnel with a fluted cork and some cotton or wool lint, then a layer of sand of half an inch, on this four ounces of the charcoal, and lastly, the colocynth powder intimately mixed with the charcoal, packed firmly, the whole covered with muslin and a layer of sand. Alcohol is now

poured on, and if the materials have been properly packed its passage will be sufficiently slow; but if too loose, the rapidity of the percolation must be regulated by means of a cork so that it will pass by drops. A bright yellow concentrated tincture is obtained which should amount in all to five or six pints. If convenient, to regain a portion of the alcohol it may be effected in a well-tinned still or glass retort by aid of a water bath, but the product is lighter colored when the evaporation is conducted at a temperature not exceeding 130° F., to dryness or until a soft resinoid mass is obtained, which can be pulled like candy. This after exposure in layers acquires a friable consistence, and is finished. About seven ounces were obtained from thirty-two ounces of the best French pulp, or about six per cent. of the crude drug. Dose from one-half a grain to two grains.

ON GLYCERINATED EXTRACTS, ETC.

By T. S. Wiegand.

Glycerinated Extracts.—The difficulty of incorporating extracts in ointments, syrups and mixtures generally, has been one that many of us have frequently experienced. The most simple and unobjectionable method I have yet seen is to work up any given extract with an equal weight of pure glycerin, added gradually during the process of mixing it. This obviates the trouble of mixing the extract in any one of the many ways which extracts are now so commonly employed. It is an excellent manner in which to exhibit belladonna when required to be applied to the breast, or to tumors, and the facility with which it can be washed off is a very great advantage over the ointment which is so commonly directed. Of course, double the weight of the extract prescribed must be used when thus prepared.

Drying Lozenges.—The frequent warm and wet weather we have had this winter has much increased the difficulty of drying lozenges, and to obviate the delay thus occasioned I have used a case made tight at the joints by varnishing or painting, and securing a close joint where the lid shuts by covering the edges of the box with leather like the swell box of an organ. The fastenings are to be so arranged that as they are driven up they

draw down the lid tighter upon the edges of the box. In the bottom of the box a tray is fitted, upon which quicklime in small pieces is to be placed, and the lozenges placed over it upon plates of glass or sheets of tin, supported by cleets nailed to the sides of the box. The lid should be closed at once and fastened tightly. After a lapse of a few days, the lozenges will be found sufficiently dry and hard to cut and box. This method has proved very satisfactory in my own experience.

Compound Infusion of Gentian.—I would simply note that the method recommended by James T. Shinn, on the 30th page of this journal for the year 1862, has proven satisfactory in my experience for several years past.

ON PURE PEPSIN.

By M. Bruke.

Pepsin can be precipitated from its solutions by agitation with cholesterin, phosphate of lime, or animal black; dissolved in water containing phosphoric acid, it can also be precipitated when neutralized with lime water, and is contained in the precipitate of phosphate of lime without being in combination with that salt.

On these facts, M. Bruke has based a new process for the preparation of this important substance; he has obtained it in a state of purity unknown to this time, and which permits him to rectify a good number of statements in regard to it in the treatises.

Two recent hogs' stomachs are digested in weak phosphoric acid, at the temperature of 100 F., which detaches the mucous coat in fragments. The solution is filtered and the residue again digested at the same temperature. The filtrate should be clear, and yellow prussiate should not indicate albumen. Lime water is now added until the neutralization is nearly complete as tested by litmus, the precipitate collected, expressed, and dissolved in water containing hydrochloric acid. The clear solution is again precipitated by lime water, redissolved by hydrochloric acid and filtered.

Into a flask, sufficiently large to contain the liquid, a funnel with a long beak is introduced, into which a solution of choles-

terin prepared cold with a mixture formed of four parts of alcohol of 94 per cent. and one part of ether. By contact with the acid liquid the cholesterin separates in very fine particles and rises to the top of the liquid; when the coagulum acquires the thickness of about two centimetres, the funnel is removed and the liquid shaken quickly and frequently, by which the pepsin is removed from solution by the cholesterin; afterwards filter, wash the filter with acid water and then with pure water, till the washings lose their acidity and reaction with nitrate of silver. Now in treating with ether, the cholesterin is dissolved whilst the adhering water forms an opaque layer with the pepsin, which is agitated repeatedly with fresh portions of ether until nothing remains, but an aqueous liquid from which the adhering ether passes off, and leaves a transparent solution of pure pepsin.

When acidulated with dilute hydrochloric acid, this liquid possesses energetic digestive properties, dissolving fibrine readily in an hour.

As has been remarked, that pepsic liquid is far from partaking of the reactions which are usually considered the characteristics of pepsin. Thus it is not affected by any of the reagents which indicate albumen, as per example by nitric acid, tincture of iodine, tannin and bichloride of mercury. This last point is of great importance, since the pepsin analysed by M. Schmidt was prepared by precipitation with bichloride of mercury.

Nitrate of silver renders the liquid lightly opaline. Bichloride of platina occasions a sensible troubling; it is precipitated abundantly by the acetates of lead even in the presence of free acetic acid. It follows from this that our ideas of pepsin ought to be modified and its analysis made.—*Jour. de Pharm. Dec.* 1862.

ON THE METALLURGY OF PLATINUM.

By MM. H. Sainte Claire Deville and H. Debray.

The manufacture and uses of platinum are interesting in the highest degree to chemists, especially to theoretical chemists, who in their analytical operations so frequently make use of the remarkable properties of this precious metal. We therefore ask permission to present some observations and experiments we

have recently made to complete the new system of metallurgic treatment we published some years ago in the French scientific serials. *

One of us has had an opportunity of witnessing our processes applied with great success by a clever English manufacturer, Mr. Matthey, of London. An ingot of platinum of 100 kilogrammes was melted in a quick lime furnace with lighting gas and oxygen. Under the influence of these powerful agents, the mass became so liquid that it filled exactly with metal every part of the mould, and reproduced all its imperfections with unexpected precision.

The experiment occupied four hours; but as it took about half this time to heat the furnace itself, four hours, short time as it is for such an operation, may be considered as the maximum.

The aspect of this glowing liquid mass was a sight not easily to be forgotten. For this large operation, Mr. Matthey used the gasometer for melting ingots of from 20 to 25 kilogrammes, for which he has daily occasion. It is a surprising fact that, having on this occasion for the first time replaced the manganese or sulphuric acid, usually used in the preparation of oxygen, by chlorate of potash, Mr. Matthey decomposed at one time, and without taking any precaution, 22 kilogrammes of it mixed with its weight of manganese. The gas was disengaged with prodigious rapidity; but there is really no danger of an explosion, provided the tubes are sufficiently large to carry off the gas. There is even no sensible increase of pressure in the apparatus.

A new process for moulding platinum is now used, invented by M. Heraeus, manufacturer at Hanau, and applied with considerable success in London. M. Heraeus, by the advice of his illustrious master, M. Wohler, has adopted for several years the processes we published on the treatment of platinum, which, in the hands of a clever manufacturer and an enlightened chemist, have undergone already, as we anticipated, simplification and improvement. M. Heraeus runs the platinum into moulds of

* See *Annales de Chimie et de Physique*, 3d Series, vol. lvi. p. 385, and vol. lxi. p. 5; *Annales des Mines*, 5th Series, vol. xvi. p. 1, and vol. xvii. p. 71.

forged iron, the use of which we had given up; but he obviates all the inconveniences arising from the fusibility of the iron by placing at the bottom of the mould a leaf of platinum 1 millimetre thick, which supports the first contact of the fused metal.

Owing to this precaution the ingots are very perfect, entirely free from those blisters so often visible upon cast metals, from which platinum is no more exempt than the other metals when it has been carelessly moulded.

From observations made in England it is found that the alembics used in the manufacture of concentrated sulphuric acid are much more durable when fabricated with the cast platinum which Mr. Matthey now exclusively employs for this purpose. The platinum united by Wollaston's process is porous, and frequently allows the hot acid to leak through. We ought, moreover, to warn the manufacturers of platinum that the sulphuric acid prepared with Peruvian nitrate of soda contains a little chlorine, which acts upon the gold solder of platinum alembics with remarkable facility. For this reason it is very desirable to substitute for the gold in these vessels platinum melted by our oxyhydrogen blow-pipe, and spread over the surfaces, to be united by the autogenous soldering processes.

This process, utilised for some time in England, gives excellent results, and from the great difference in value between gold and platinum, effects considerable saving.

One of us has had the opportunity of seeing in the laboratory of Mr. Matthey some tubes cast by this process, and drawn out without defect; and in the laboratory of MM. Desmontis, Chapius, and Quennessen some experiments tried upon cast platinum which promise valuable results.

Unhappily for the developement of the platinum manufacture, the enormous price of these alembics has driven the makers of sulphuric acid to substitute for them vessels of lead glass. Seven-tenths of the concentrated acid are now made in England with glass vessels, of which the first cost and expense of repairs are scarcely equal to half the annual interest of the sum necessary to provide a large platinum distillation vessel. The improved apparatus we offer to manufacturers—an improvement already realized in England, as we can vouch—consists in an alembic capable of concentrating at least from two to four tons

of acid every twenty-four hours, at a price, at most but a fifth or sixth of the apparatus actually in use. By this reduction in price we believe that the workers in platinum will preserve to this metal a market,—a reduction to the interest of all, to the interest of our laboratories, our chemical manufactories, and to the platinum makers themselves. The developement of platinum manufactures depends also on the Russian Government, which was the first to offer liberal incentives to improve and develope it. From information furnished us by M. Jaunez, a distingished engineer well acquainted with the Oural mines, the yield of platinum ore is easy capable of three-fold increase were the sale of these ores freed from all trammels. It is impossible to say at present to what rate the metal itself might fall if extracted by the economical processes we have published. Nor can we foresee the purposes to which the metal may be advantageously applied, its excessive price hindering all trials. It is to be hoped that the Government of Russia, which on this point has shown a real love of progress, and has profited by the counsel of its most distinguished scientific men, will make an entire change in a manufacture from which science benefits so largely.

We have called the attention of manufacturers to the advantages accruing, in some instances, from the use of iridium and platinum alloys, particularly of the natural alloy obtained by the direct fusion of the ores in an oxidising atmosphere. To facilitate the introduction of iridium into platinum, we have tried to find an economical way of extracting, by Wollaston's process, pure iridium from the residuums of platinum manufactures, residuums existing in large quantities in all the great factories of Europe. We have had recourse to the method of attacking by baryta, and in the interest of manufacturers we ask permission to describe summarily the operations. We took :—

Osmide of iridium, or residue † . .	100 parts
Nitrate of baryta	100 "
Baryta	200 "

After being pulverized and well blended, the mixture is put into an earthen crucible and made red hot. The black matter and

† These residuums were kindly lent to us by Mr. Matthey, whom we take this opportunity of thanking for the intelligent and disinterested assistance he has in many instances afforded us.

fritt resulting from this calcination is pulverised anew, and is put by small portions into cold water until the mass is well moistened. Nitric acid is carefully added to it, and the mixture is heated in a sand bath, either before a good chimney to carry off the osmic acid vapors which arise, or in a distilling apparatus; if it is wished to collect them, they can be fixed by caustic ammonia. When all osmic odor has disappeared, and enough nitric acid has been added to make the mass perfectly liquid, pour into the liquid a very small quantity of hydrochloric acid until the whole becomes of a yellowish red color. Heat again; then pour into a funnel stopped up with gun-cotton, or into a sugar mould. The liquid, which flows slowly, contains chlorides of platinum, iridium, rhodium, and salts, with common metal bases. But the nitrate of baryta, being insoluble in liquid acids, remains on the funnel impregnated only with metallic chlorides. Displace these with a little pure water, as in the sugar refining process, and pure nitrate of baryta remains, not being carried away in any appreciable quantity with the dark thick liquid flowing through the funnel. We thus obtain:

Nitrate of baryta . . . . . 474 parts.

This nitrate of baryta, which contains a little unattacked substance, serves for a fresh operation.

As to the liquid containing the precious metals, a few drops of sulphuric acid will free it from all trace of baryta, and then it is to be treated by the processes described in our memoir to which we refer.

In this way we have obtained, with three specimens of platinum prepared by precipitation by means of iron;—

	I.	II.	III.
Iridium with platinum . . .	33·1	38·7	52·9
Rhodium	20·0	5·9	8·1
Palladium	0·2	—	—
Osmium, common metals, and loss .	46.7	55·4	39·0
	100·0	100·0	100·0

In the first of these operations the amount of unattacked matter was 0·15 per cent.; in the second, 0·2 per cent.; in the third it was imperceptible. These figures annul M. Clau's objec-

tion that, in our analytical process founded on the same method, the rhodium was not entirely attacked by the baryta.

Mr. Matthey has modified this method by replacing the baryta, which we used to diminish the fusibility of the mixture, and which is very expensive in England, by nitrate of baryta itself, which is very cheap.—*Lond. Chem. News, Sept.* 1862, *from Comptes-Rendus.*

THE CINCHONA FORESTS OF SOUTH AMERICA.*

By Dr. Karl Scherzer.

(Translated for the American Journal of Pharmacy.)

When the frigate Novara left Batavia, I cherished the hope that our stay in South America would be sufficiently long to allow of undertaking a journey to the cinchona forests; and to be able to answer through personal observation, certain questions, entrusted to us by Dr. Junghuhn, of Lembang, in regard to the conditions essential to the growth of the species of cinchona cultivated in Java. Instead, however, of the expedition as originally planned, it was only allowed me to tread the classic soil where Humboldt gathered the first scientific treasures; and this only for so short a time, that my visit had to be limited to the capital of Peru, and its immediate neighborhood. A scientific excursion to the cinchona forests lying far in the interior was out of the question, under the existing circumstances. I did not neglect, however, to translate the inquiries confided to me by Dr. Junghuhn, into the English and Spanish languages, and to forward copies of these interesting desiderata to such persons in Chili, Peru, and Bolivia, who from their mercantile position, or their interest in scientific discussions, seemed to be able to contribute towards deciding several questions respecting the growth of the cinchona in its native country. I took pains, at the same time, to collect for myself information on this subject, as often as opportunity offered, and by a very fortunate accident (as it appeared to me) I met in Lima Mr. Campbell, a merchant of Bolivia, who for many years has been living in Tacna, and has paid particular attention to the cinchona trade.

*From the Voyage of the Austrian frigate Novara, around the earth, in 1857, 1858, and 1859. Vienna, 1862.

For the chief export of this important drug is from Bolivia, and not from Peru, as its commercial name "*Peruvian Bark*" might lead one to suppose. This designation dates from the time when the Bolivia of to-day (in whose forests the cinchona chiefly grows) was an integral part of Peru, and was called Upper Peru: while from the present republic of Peru, scarcely any Peruvian bark is exported, and that collected in New Granada and Ecuador, and known under the name of Pitaya bark is of a quality far inferior for medicinal purposes.

The most important fact, which I am at present able to communicate is in correction of a wide spread error, that by the greed of gain, the extermination of the cinchona tree in its native home is near at hand, and that the supply of the remedial agent derived from its bark, which has become to the practising physician as indispensable as the Peruvian potato is to the working classes, will soon no longer suffice for its daily increasing use. The Calisaya region (i. e. in which the Cinchona Calisaya, whose bark is most prized and valuable, occurs most abundantly, and thrives the best) stretches from one degree north of Lake Titicaca to the twentieth degree of south latitude. In the forests of Cochabamba, viz. between this point and La Paz, the cinchona occurs more abundantly than in those forests lying parallel to La Paz, in which it is now found only at such a distance from the city, that the cost of transportation through the wilderness amounts to 17 pesos per hundred-weight. The forests lying more southerly, on the contrary, are still untouched by the axe of the *cascarilleros*. The largest proportion is exported from Tacna and Arica, a small quantity only, suspected of being contraband, goes northward from Lake Titicaca, in order to be shipped through Port d'Islay.

From the district above mentioned 8 to 10,000 hundred-weight of bark could be annually gathered for an indefinite period, without the least danger of exterminating the tree. Since 1845 the exportation of cinchona bark from Bolivia has been a monopoly of the government, which conveyed the right to a company which bound itself under a certain sum to the yearly export of 4000 hundred-weight.

This company paid the *cascarilleros*, or persons who gathered the bark in the cinchona forests, 25 to 30 pesos, for every hun-

dred-weight of Calisaya bark delivered in La Paz, the chief city of Bolivia. But this arrangement had but partial success, for speculation and avarice, as well as the continual political unsettlement, and alterations in the government of the country, stood in the way of the quiet development of this branch of industry and trade. Each new President wished to draw the greatest possible gain from the natural treasures of the soil, and the sum demanded for the right to export the cinchona bark constantly advanced. In 1850, a native mercantile house in La Paz paid to the bark gatherers 60 pesos for every hundred-weight, besides an export tax to the government of 25 pesos per hundred-weight, while the contractors bound themselves to a yearly collection and export of 7000 hundred-weight. The exorbitant price paid to the *cascarilleros* occasioned an enormous quantity of Calisaya bark to be brought to La Paz. In order to restore the average, and not to fill the market far beyond the demand, the government now prohibited the cutting and gathering of the cinchona bark. Within 18 months 18,000 hundred-weight had been delivered, and this circumstance caused such a fright among the monopolists that they declared themselves bankrupt, and were only spared from complete ruin by the moderation of the government, which took possession of the whole stock, paid the speculators with certificates, redeemable in certain periods, and concluded a new contract with a native mercantile house, in which the selling price of an hundred-weight of bark delivered in La Paz was limited to 65 pesos clear of further export duty.

As soon as the present stock is exhausted, it is probable that the prohibition on the cutting of the Calisaya bark will be again withdrawn, and by the serious lesson learned in the mean time, the excessive and dangerous eagerness of the *cascarilleros* for collecting may be prevented.

My visit in Java, was just at the time when chemical experiments were being tried on the bark of the young cinchona trees, and the fact that in these the costly alkaloid was not found, excited the apprehension that the bark of these trees, cultivated with such great care, would perhaps be entirely destitute in the land of their adoption—under altered climatic and geognostical circumstances—of their most valuable constituent. But the information obtained by me in South America shows that even in

its native home, the quinia is met with only in the bark of the older trees, and its quantity bears a proportion to the age of the branch. The bark of trees which are 50 years and more in age are the richest in quinia. To the ignorance of this fact must probably be attributed the annual felling by the cinchona-gatherers, or cinchona-hunters (*Cazadores de Quina*) during the time of the Spanish rule, of 800 to 900 cinchona trees of 4 or 5 years of age, in order to obtain the 110 hundred-weight of bark which was sent from Payta around Cape Horn to Cadiz, exclusively for the use of the royal court.

In reference also to the quantities annually exported from South America, and consumed in European preparations, very considerable errors have crept in, even in scientific circles.

The total export of cinchona from South America, from 1830 to 1860 has not exceeded according to reliable accounts 200,000 hundred-weight* (the seven inferior kinds not included) while of Calisaya, the real red bark (cascarilla roja) certainly not more than 120,000 hundred-weight has been sent abroad. While thus the yearly export of Peruvian bark appears to be far less than is generally supposed, a species of cinchona has lately for the first time been discovered in the forests of Bolivia, between Tarija, Cochabamba, and La Paz, whose bark is said to possess the same characteristics as that of the Cinchona calisaya. The curate in Tarija has offered for sale nearly 3000 hundred-weight of this valuable bark (called *Sucupira* by the Indians.) The position of the forests is so favorable for export, that the freight from Tarija to Iquique, the nearest sea port, is but from 8 to 10 pesos per hundred-weight.

Upon referring to these communications, and to the not inconsiderable increase which has resulted from the successful propagation of the cinchona in Java and the East Indies, all apprehension may disappear that this noble tree is nearly exterminated, and suffering humanity threatened, by ignorance

* Weddell, on the contrary, states, that one manufactory, that of Pelletier, Delondre, and Levaillaux in Havre, had used in one year (1837) not less than 17,400,000 hundred-weight of the best cinchona bark in the production of quinia. This is either a typographical error, or a colossal exaggeration.

and vandalism, of being deprived of one of the most active and important of the physician's remedies.—*Vierteljahresschrift für Praktische Pharmacie, Bd.* xii. H. I. G. J. S.

ON THE PREPARATION OF CRYSTALLIZABLE ACETIC ACID.

By M. Tillmans.

Take *six* parts of acetate of soda in crystals, fuse the salt in its water of crystallization, and evaporate to dryness, and melt the dry mass by a carefully increased heat. The residue weighs but half as much as the original salt. This is distilled with *five* parts of ordinary sulphuric acid to dryness. The product is apt to contain sulphuric acid, which is removed by a little litharge and redistilling which gives the acid pure. By exposing the product to the cold till it crystallizes, and draining off the liquid portion by which the remainder is left as a monohydrate, six parts of acetate of soda gives 2½ parts of glacial acetic acid. —*Jour. de Chim. Med., Sept.* 1862.

ARTIFICIAL PRODUCTION OF ICE.

An apparatus has lately been proposed in Europe for the artificial formation of ice of somewhat the following construction.

From a strong solution of ammonia (·895 sp. gr.) the gas is developed, and liquified by cooling under a pressure of 10 atmospheres. After removal of the pressure it is conducted into a vessel containing a saturated solution of chloride of calcium, and into this solution, which, without being frozen, has been reduced to the temperature,—22 (Fahr.) a number of metal tubes are placed containing water, which is congealed in a few minutes. During the freezing the tubes are kept in a rotary motion.

The preparation of a solution of ammonia of the requisite strength is not so easy as it appears. Distillation is not sufficient, but a solution of the usual strength must first be prepared, put in bottles, surrounded by ice water, and ammonia then passed into it, until no more is absorbed.—*Vierteljahresschrift für P. Pharmacie, Bd. Vol.* xii. H. I. G. J. S.

ON THE RELATIONS OF DEATH TO LIFE IN NATURE.

By J. D. Dana.

1. The creation of a plant with "seed in itself," as Moses states in his concise description, was the simultaneous institution of life and death. It was the establishment of an incoming and outgoing stream, to be in constant flow as long as the kingdoms of life should last—an incessant renewal of youth, and rejection of age.

All life is a system of progressing change in cycles—the germ first, then the embryo, the young, the adult, and last, the seed or germ again, to continue the rounds; the adult sooner or later disappearing from the field of progress, and then from the sphere of existence. Death is implied in the very inception of the scheme.

2. Death is also in every step of the process of life. For the living being is throwing off effete matter during all its growth; the change is constant, so that with each year a large part of the material in our bodies has passed away and been replaced by new. Moreover, the force which had been expended in making a cell, or particle of tissue, goes to form a new cell or particle when the former dies, and was needed for the new formation going on. Force is not lost or wasted, but used again. There is unceasing flow, and in this flow is life; its cessation is death.

3. The kingdom of plants was instituted to turn mineral matter into organic, that the higher kingdom of animals might thereby have the means of sustenance; for no animal can live on mineral matter. Now this living of animals on plants implies the death of plants.

Again, the rocks of the globe are, to a great extent, made of the remains of dead animals.

4. The chemistry of life, also, required death. Life in the plant or animal, if sustained by means of nutriment, and continued consuming, with no compensating system, would evidently end in an exhaustion of any finite supply. A perfect adjustment was therefore necessary, by which nutriment should sustain life, and life contribute to nutriment. Now the plant takes up carbonic acid from the atmosphere, appropriates the

carbon, and gives back the oxygen. Yet there is no tendency to an exhaustion of the atmospheric carbonic acid, or an oversupply of the oxygen; for death strikes an exact balance.

The death of the plant ends in a change of all its carbon into carbonic acid again. Thus the plant, as it grows, decomposes carbonic acid to get carbon, and then ends in making, by its decay, as much carbonic acid, and restoring it to the atmosphere. Thus, through death the compensation is perfect. The atmosphere loses only what it receives. Again, as just now observed, the plant, in growing, gives oxygen to the atmosphere; but in the decay of the plant, the carbonic acid formed is made by taking up the same amount of oxygen. The same carbon that lost oxygen when becoming a part of the plant, takes it again at the decay. The system is hence complete. The parts play into one another in perpetual interchange. Take death and decay out of the system, and it would not work.*

Animal life, as above stated, was made to subsist on plants. But the scheme is so well managed as not to disturb the balance made by the vegetable kingdom alone. For all the carbon of animals comes from plants. The plants which feed an animal, and which, on decay, would have turned into carbonic acid, become changed into carbonic acid in the course of the growth of the animal, so that the whole amount of carbonic acid which the animal makes, is only what the plants would have made if left to natural decay. Thus the higher kingdom of life is introduced and sustained, and yet the balance remains undisturbed. The system is perfect.

5. Again, one part of the animal kingdom, through every

* In early geological history, as is generally believed among geologists, there was an excess of carbonic acid in the atmosphere; and this excess was removed to a great extent, by the growth of plants during the Carboniferous era. Vegetable material decaying under water does not undergo complete decomposition, and thus part of the carbon is left behind; and so far as there is carbon left, there is an actual abstraction of carbonic acid from the atmosphere, by the process of growth. The Coal-era was a period of great marshes; and by this means the needed purification of the atmosphere was effected, preparing it for land life. The amount abstracted now by the same means is very small, and may be balanced by the carbonic acid from mineral sources and volcanoes.

class, is made to eat up the other part, or at least live on it. The flesh-eaters are of all grades, low and high, from the infusorium and maggot, to the lion and man. Some take what is already dead or decomposing; others kill and eat. On this subject we observe:

(1.) Death is in the system of nature—death from earthquake, lightning, and all the moving forces, as well as by natural decay; and the creation of carnivorous animals was hence in harmony with the system.

(2.) Various noxious animals are held in check by the carnivorous species.

(3.) By means of flesh-eaters, the diversity of animal species subsisting on a given amount of vegetation is vastly increased, and a wider expansion is given to the animal kingdom.

(4.) Putrefaction of the dead is prevented by a multitude of scavengers, who at the same time turn the flesh into food for the vegetable kingdom; and thus plants feed animals, and animals feed plants,—one of nature's circles again.

The last two principles mentioned are of profound importance. The vegetable kingdom is a provision for the storing away or magazining of force for the animal kingdom. This force is acquired through the sun's influence or forces acting on the plant, and so promoting growth; mineral matter is thereby carried up to a higher grade of composition, that of starch, vegetable fibre and sugar, and this is a state of concentrated or accumulated force. To this stored force animals go, in order to carry forward their development; and moreover, the grade of composition thus rises still higher, to muscle and nerve, (which contain nitrogen in addition to the constituents of the plant,) and this is a magazining of force in a still more concentrated or condensed state. There are thus five states of stored force in nature—three in the *inorganic*, the solid, liquid, and gaseous; and two in the *organic*, the vegetable and animal.

Now what is the provision to meet this last and highest condition? Is this magazined force left to go wholly to waste by the death and decomposition of the plant-eaters? Just the contrary: an extensive system of flesh-eaters was instituted which should live upon it, and continue it in action in sustaining animal life among successive tribes. The flow is taken at its height,

and the power is employed again and again, and made gradually to ebb. What is left as the refuse, is inorganic matter—the excreted carbonic acid, water, and excrements, with bones or any stony secretions present. Thus the flow starts at the inorganic kingdom, and returns again to the inorganic. Moreover, in the class of quadrupeds, (mammals,) the flesh of the herbivores (cattle), is among the means by which the animal type is borne to the higher grade of the carnivores. The true carnivores, besides, take the best of meat. Whales may live on the inferior animals of the sea; but the large forest flesh-eaters take beef and the like.

There is another admirable point in this scheme. The death and decomposition of plant-eaters would have rendered the waters and air, locally, at least, destructive to life. It is well known that it is necessary in an aquarium to have flesh-eaters along with the plant-eaters and plants. And when in this way the living species are well balanced, the water will remain pure, and the animals live on indefinitely. If not so balanced, if an animal is left to decay, the waters become foul, and often everything dies. Putrefaction and noxious chemical combinations follow death, because, in life, the constituents, carbon, hydrogen, nitrogen, and oxygen, are in a constrained state, at the furthest remove from what chemical forces alone can produce; and hence when the restraint is taken off at death, the elements fly into new conditions according to their affinities. Now animals, dying yearly by myriads, are met at death by an arrangement which makes the dead contribute anew to animal life as its aliment, and in this very process the flesh ultimately comes out innocuous, and is at last so far changed to the inorganic condition as to be the best of fertilizers for plants. Part of the process of getting rid of the great fleshy carcasses, consists in their minute subdivision by the feeding of larvas of insects, and, further, an infinitesimal division of the insect as the food of the infusoria,—which again may become the nutriment of larger animals, to go the rounds once more. But the final result is, as stated, *plant-food*—largely through the processes of digestion and excretion, but part through the decomposition of animals that are too small and readily dried up to prove offensive.

Thus the carnivorous tribes were necessary to make the system of life perfect.

One word respecting the necessity of a check on the excessive multiplication of individuals. Nature, as just now observed, is a system of constantly varying conditions—of changing seasons, winds, clouds: of inconstancy, under law, in all forces and circumstances. At the same time, the growth of a species requires the nicest adjustment of special conditions in each case. On this account the reproductive powers in species is in many cases excessively large, so that the various accidents to which the eggs or young would be exposed, might not cause their extermination. This provision opened the way for occasional excessive multiplication, and required a check from carnivorous races.

6. Finally, could death be prevented in a system of living beings in nature without constant miracle? How should the earth be managed to secure it against death? It would be necessary to still the waves, for they are throwing animals and plants on the coast to die; to still the winds, for they are ever destroying in some parts of their course; to still even the streams and rains. With winds and waves, not only helpless animals and plants, but men's houses, ships, and boats, would now and then be destroyed, in spite of prudent precaution and holy living. But if we still the waves, the winds, and the streams, the earth would rot in the stagnation, and here again is death!

We thus learn, that in life the fundamental idea of reproduction implies death; the processes of life are the processes simultaneously of death; the stability of the system of life requires death; the vegetable kingdom is made to feed animals, and the animal kingdom, while containing plant-eaters, demands flesh-eaters for its own balance, for the removal of the dead, and to make out of dead flesh the proper food for plants, thus to pay its debt to the vegetable kingdom. Hence, death pervades the whole system of life in its essence and physical laws; and it could not be prevented in a world of active forces except by a constant miracle; and this would be an annihilation of nature, that is, of a system of law.—*Am. Journ. Science and Arts, Nov.* 1862.

CARDAMOMS.

[The following article from the *London Chemical News* will give a reason for the high price of cardamoms outside of commercial difficulties.—ED. AM. J. Ph.]

How many English people know anything of cardamoms? Among the tens of thousands of daily visitors to the universal repository of products and fabrications at South Kensington, are there a hundred, or even a score, who could go straightway to the case, or even to the court, in which the article cardamom is exhibited? Tell us, well instructed reader, replete with the contents of the official catalogues,—tell us off-hand what it is; or tell us in three guesses, whether it is a sea-shell, a dried fish, or a conjuring toy—something to eat, or drink, or wear—a vegetable, mineral, or animal substance? When you have excogitated a wholesome conclusion of ignorance, go into the Indian collection at the top of the north-east staircase. There you will find, among the vegetable substances from which drinks are concocted, two or three bottles labelled with the name of the article you seek, and you may construct your own natural history of the brown husky beans, something like rough over-grown almonds, that are there set forth as the growth of Travancore, and other districts of India. Perhaps in the Chemical Department you may find also a bottle labelled "Tincture of Cardamom," and in that deep red fluid you will see the stomachic for the sake of which cardamoms are cultivated, farmed, and taxed.

Yes, farmed and taxed. The commodity of which Englishmen know so very little is an article of revenue to their Indian Government, and the collection of that revenue matter of bargain between the Government and a contractor or farmer. The affair is managed in this wise:—Once in five years the collector at Calicut puts up to auction the cardamom farm of the district of Wynaad. The district includes seven talooks on the sides of those lesser ghauts that terminate in Malabar, the western mountain chain of the peninsula. Wynaad, the chief of these talooks, giving its name to the whole, is especially favored by nature in the matter of cardamoms. A rugged and inaccessible region—suspended, as it were, between Mysore and Mala-

bar, and long a debatable as well as border land—it would have no commercial value but for its remarkable aptitude for the production of this pungent spice. The native rajahs gave the Company some trouble in the days of the Mysore chieftains, and the Company avenged itself by taking possession of the soil and the crops forever. The purchaser of the cardamom farm of Wynaad acquires at once an exclusive right of taking the whole crop of cardamoms at a fixed price. The grower must gather the crop, dry and clean it, take it to a place agreed upon, and there deliver it up at the price fixed for him by the Government, usually about a fourth of the market price. The contractor may use his own weights and pay in his own coins, leaving the poor peasant-cultivator to get redress, if he can, for errors and frauds. To conceal or secretly sell any of the pods is an offence against the revenue laws and an injury to the contractor, for the prevention of which armed men watch the collection of the crop and search houses in which any of it may be supposed to be hidden. Of course the grower is a smuggler, and equally of course the contractor is a cheat and oppressor. A transaction with the Government—the Government of Queen Victoria—has handed over the chief produce of the soil of Wynaad, the chief property of its mountainous inhabitants, to a stranger. He has bought the right to rob them with impunity, taking without their leave every grain of their principal crop, paying them a third or fourth of what it would fetch at the nearest town, and punishing them if they attempt to withhold but a single bag of their produce. And after having made a profit of thousands of rupees out of the rapacity of the contractor and the helplessness of the grower, the Government stops the export of the crop until it has paid toll for the privilege of going out of the country.

ARTIFICIAL TOURMALINES.

To the Editor of the *Chemical News*.

Sir,—In reply to your correspondent's inquiry relative to a method of forming "Herepath's Artificial Tourmaline," I beg to inform him that he will find the requisite information in the

following extract from Bird and Brookes' "Natural Philosophy," page 503:—

"Dissolve 50 grains of disulphate of quinine in two fluid-ounces of acetic acid, and two of proof spirit, warmed to 130° F., in a very wide-mouthed flask or glass beaker; then slowly add 50 drops of a mixture of 40 grains of iodine in an ounce of rectified spirit; agitate the mixture and then set it carefully aside for six hours, in an apartment maintained at a temperature of about 50° F. The utmost care must be taken to avoid any motion of the vessel; indeed, all accidental vibrations should be guarded against by suspending the vessel by a string, or by allowing it to rest on a mass of cotton wool. If, in six hours, the *large* laminæ of the salt have not formed, warm the fluid with a spirit lamp, and when it has become clear, add a few drops of the solution of iodine in spirit. The large laminæ form on the top of the fluid, and should be removed carefully by gliding under one of them a circular piece of thin glass. The specimen should be drained by resting the edge of the glass on a piece of bibulous paper, but it must not be touched on account of its extreme fragility; if any small crystals adhere to its surface, they must be washed off by pouring over it a few drops of watery solution of iodine. When dry the specimen should be placed for a few minutes under a bell-glass by the side of a watch-glass containing a few drops of tincture of iodine; and lastly, a little very fluid Canada balsam should be dropped on it, and a thin glass cover applied without heat. Specimens may thus be obtained of extreme thinness, and half an inch in diameter or even larger, possessing scarcely the slightest color, and yet completely polarising transmitted light."

I am, &c. JAMES W. YOUNG.

Chem. News, Sept. 27, 1862.

QUANTITATIVE DETERMINATION OF STARCH.

BY DR. DRAGENDORFF.

Starch has been estimated hitherto by mechanical separation, by fermentation and weighing the carbonic acid, by conversion into sugar and finding the amount of the latter by means of Fehling's standard copper solution, or finally by difference. Of these methods none are worthy of entire confidence in the

majority of circumstances. Fehling's method, the best in most cases, has little value as usually conducted, since the more delicate forms of cellulose pass into sugar by digestion with acids, while the insoluble albuminoids yield both by treatment with acids and diastase, substances which reduce alkaline copper solutions.

Dr. Dragendorff of the Rostock Laboratory proceeds with starch determinations as follows: the pulverized substance after drying cut all hygroscopic moisture at 212° is digested for 18—30 hours at a temperature of 212° in 10—12 times its weight of a solution of 5—6 parts of hydrate of potash in 94—95 parts of anhydrous alcohol. The digestion must take place in sealed glass tubes, or in a silver vessel which admits of closing perfectly. By this treatment the albuminoid substances, the fats, the sugar and dextrin are brought into such a condition that simple washing with alcohol or water suffices to remove them completely. The chief part of the phosphoric and silicic acids is likewise rendered soluble. The starch grains are not affected, neither does the cellulose undergo alteration, either qualitatively or quantitatively. In fact this treatment serves excellently to isolate starch grains for microsopic investigations. Besides starch and cellulose nothing resists the actions of alcoholic potash save portions of cuticle, gum, and some earthy salts.

When the digestion is finished, it is advisable, especially in case the substance is rich in fat, to bring the contents of the tube upon a filter while still hot, as otherwise potash salts of the fat acids may crystallize out. It is also well to wash immediately, first, with hot absolute alcohol, then, with cold alcohol of ordinary strength, and finally, with cold water until these several solvents remove nothing more. In the analysis of matters which contain much mucilage, as flaxseed, the washing must be completed with alcohol of 8—10 per cent., to prevent the swelling up of the residue.

The filter should be of good ordinary (not Swedish) paper, should be washed with hydrochloric acid and water, dried at 212°, and weighed. When the substance is completely washed, the filter and its contents are dried, first at 120° and finally at 212°. The loss consists of albuminoids, fat, sugar and a part of the salts of the substance, and when the last three are separately

estimated, it may serve to control the estimation, by elementary analysis, of the albuminoids.

The filter with its contents is now reduced to powder or shreds, and the whole is heated with water containing 5 per cent. of hydrochloric acid until a drop of the liquid no longer reacts blue with iodine. The treatment with potash leaves the starch grains in such a state of purity from incrusting matters, that their conversion into dextrin proceeds with great promptness and is accomplished before the cellulose begins to be perceptibly acted upon. By weighing the residue that remains from the action of hydrochloric acid, after washing and drying, the amount of cellulose, cork, lignin, gum and insoluble mineral matter is found. By subtracting these from the weight of the substance after exhaustion with potash, the quantity of starch is learned with great accuracy. The only error introduced by this method lies in the solution of some saline matters by the acid. The quantity is, however, so small as rarely to be appreciable. If needful, it can be taken into account by evaporating the acid solution to dryness, incinerating and weighing the residue. By warming with concentrated malt extract at 132°, the starch alone is taken into solution, and no correction is needed for saline matters. If it is wished to determine the sugar produced by the transformation of the starch, a weaker acid must of course be employed. In case of mucilaginous substances, the starch must be extracted by digestion with a strong solution of chloride of sodium, to which the requisite quantity of chlorohydric acid has been added, and the residue should be washed with water to which some alcohol has been added.—S. W. J. *Am. Jour. Sci. and Arts, Jan.* 1863, *from Henneberg's Journal für Landwirthschaft*, 1862.

CONTENT OF STARCH IN VARIOUS SEEDS.

By Dr. Dragendorff.

Dragendorff, applying the method already noticed, for estimating starch, found the following percentages, which are interesting, either as serving to compare the results of his method with those obtained by others, or on account of including some seeds of which hitherto no analyses have been attempted. Dragendorff finds that in the seeds of colza and mustard the

starch does not exist in the form of grains; but in an unorganized condition (*formlose Stärke* of Schleiden). In the seeds of the Leguminosæ, Dragendorff supposes a new and undescribed carbohydrate to exist, which has been confounded with starch hitherto, but which, unlike starch, is soluble in potash solution.

	Loss by drying.	Loss by treatment with alcoholic solution of potash.	Starch.	Cellulose, cork, cuticle, lignin, mucilage, and insoluble mineral matters.
Wheat,	13·2	18·7	59·5	8·6
Wheat flour,	15·8	12.6	68·7	2.9
Rye,	11·0	23·2	59·7	6 1
Oats,	11·9	22.1	46·6	20·4
Barley,	11·5	23·5	57·5	7·5
Timothy seed,	12·6	29·9	45.0	12·5
Rice (hulled),	13·3	17·1	61·7	7·9
Peas,	5·0	34·2	37·3	23·5
Beans (white),	16·7	45·1	33·0	5·2
Clover seed,	10·8	60·0	10·8	18·4
Flax seed,	7·6	46·1	23·4	22·9
Mustard seed,	8·5	51·5	9·9	30·5
Colza seed,	5·8	63·5	8·6	21·1
Teltow turnips,*	dry substance	79·8	9·8	10·4
Potatoes,	dry substance	31·6	62·5	5·9

—*Am. Journ. Sci. and Arts, Jan.* 1863. S. W. J.

ON THE DETECTION OF POPPY AND OTHER DRYING OILS IN OLIVE AND ALMOND OILS.

By M. Wimmec.

It is known that the olein of the drying oils is distinguished from that of the fatty oils by not being convertible into elaidic acid, and consequently not becoming solid. Professor Wimmec has lately proposed a convenient method of making elaidin, which can be employed to determine the presence of drying oils in either oil of almonds or olives. In treating iron filings by nitric acid, in a glass flask, nitrous acid vapors are evolved, which are conducted by a glass tube into water on which the oil to be examined is poured. If the oil contains but a small quantity of poppy oil it will form drops on the surface, whilst the oil of olives or almonds will be converted entirely into crystallized elaidin.—*Jour. de Pharmacie, Dec.* 1862.

* A sweet and mealy turnip grown on light soil for table use.

ON THE MANUFACTURE OF COPAL OIL VARNISH.

By M. H. Violette.*

There are three principal varieties of copal used in commerce —the hard, the semi-hard, and the soft. The two first are employed in making oil-varnish: the latter, with less resisting power, is used for interior appliances.

Hard copal is procured from Calcutta or Bombay, that from Calcutta being the best. Semi-hard copal comes from Africa. It is highly necessary that commercial lots should be composed of identical resins; they are made up of various qualities, which the buyer should be able to distinguish. (See "Histoire Naturelle des Drogues Simples," by M. le Professor Guibourt.

By heating, with steam, a vessel containing hard copal, some fragments soften more or less, while others remain intact. On throwing various fragments of hard copal into a bath of melted tin, at about 300°, some of the fragments melt and spread, while others resist, and are fused only at a much higher temperature.

The solvents of hard and semi hard copals are not known at present; that they exist is certain, because the resins flow naturally from the tree which produces them, in the form of a limpid liquid, which thickens and hardens by exposure to the air, losing by evaporation the solvent essential oil.

Notwithstanding the numerous trials of chemists and practical men, there is no other way of dissolving these copals in the mixture of essence of turpentine and oil, the vehicle used in

* This important investigation is extracted from the "Memoirs" of the Imperial Society of Science, Agriculture and Art, of Lille. The author condenses in these words the history of the manufacture of varnish:—"The manufacture of varnish is as yet only a manual art, and certainly no science. The art of making copal-oil varnish, described by the monk Theophilus, in the twelfth century, has since then made no sensible progress. The processes were long unknown to any but the makers; hence the number of worthless and often impracticable receipts which encumber books on the subject. The first descriptions were given by Watin, in his 'L'Art du Peintre, Doreur et Vernisseur,' published in 1772; then came Tingry's treatise; and, lastly, the remarkable treatise, 'L'Art de Faire les Vernis,' by Tripier-Deveaux, published in 1845." M. Violette's work is to be continued.

making varnish, than by previously decomposing them by heat. The extent of this alteration, effected by heat, is of great importance, for the higher the temperature employed, the deeper is the color of the varnish, which, in the operation, loses its primitive limpidity.

The author has determined by experiment the following fusing and distilling temperatures of copals :—

	Fusion.	Distillation.
Hard Copal,	340°	360°
Semi-hard Copal,	180°	230°

The above copals, when melted only, dissolved neither by heat nor cold, in essence of turpentine, their solubility corresponds, or is relative to a certain degree of decomposition, which the author set himself to determine practically.

Our author's experiments led him to the conclusion, that hard and semi-hard copals become soluble in a mixture of essence and oil, only after losing 20 to 25 per cent. of their weight. Beyond a loss of 25 per cent. they become more and more soluble, but at the same time darker, and yield less varnish, owing to the increased loss. He shows, also, that the least degree of coloration corresponds to the lowest temperature necessary—that is to say, about 360° ; he asserts, in consequence, that to obtain the largest quantity of the best varnish, the copals must lose 25 per cent. of their weight, by distillation at 360°.

M. Violette adds, however, that copal which has lost 10 per cent. of its weight, or even less, will readily dissolve in essence of turpentine, thickened by prolonged exposure to air and light: the actual cause of this singular modification of the essence is unknown. Were it possible, by a short, easy and cheap process, to reproduce this state, it would effect a great improvement in the manufacture of varnish.

In its actual condition, copal which has lost 10 per cent. of its weight by distillation does not dissolve in ordinary commercial essence, whether deprived of its water by mixing it with absorbing agents, or several times distilled.

Copal oil, says the author, is a product worthy of attention, as it represents about one-fourth the weight of the copal. It is limpid and yellowish. Its density about 0.80 ; it burns in the air, giving a bright light: it is soluble in oil and essence of tur-

pentine, it dissolves soft and semi-hard copals,* it might then be usefully employed in making varnish, especially if it could be deprived of its strong and persistent odor; its employment would compensate completely for the loss of copal by distillation, and the manufacturer would thus avoid loss of material.

M. Violette closes his memoir by expressing the wish that intelligent manufacturers should try to produce soluble copal, and enrich industry with this new product.—*London Chem. News, Nov.* 29, 1862.

ON THE LUMINOSITY OF PHOSPHORUS.

By Dr. Moffat.

If a piece of phosphorus be put under a bell-glass and observed from time to time, it will be found at times luminous, and at others non-luminous. When it is luminous, a stream of vapor rises from it, which sometimes terminates in an inverted cone of rings similar to those given off by phosphoretted hydrogen; and at others it forms a beautiful curve, with a descending tint equal in length to the ascending one. The vapor is attracted by a magnet; it is also attracted by heat, but it is repelled by cold. It renders steel needles magnetic, and it is perceived only when the phosphorus is luminous. Results deduced from daily observations of the phosphorus in connection with the readings of the barometer, the temperature and degree of humidity of the air, with directions of the wind, for a period of eighteen months, show that periods of luminosity of phosphorus and non-luminosity occur under opposite conditions of the atmosphere; the former being peculiar to the equatorial, while the latter is peculiar to the polar current. By the catalytic action of phosphorus on atmospheric air, a gaseous body (superoxyd of hydrogen) is formed, which is analogous to, if not the same as, atmospheric ozone, and it can be detected by the same tests. The author has found, by his usual tests, that *phosphoric* ozone is developed only when the phosphorus is luminous. Periods of luminosity and periods of atmospheric ozone take place under similar atmo-

* A long time ago, we distilled hard copal, and well remember that the viscous liquid obtained by rapid distillation dissolved hard copal.—Bw.

spheric conditions, and the conditions of non-luminous periods and periods of non-atmospheric ozone are the same. From the author's observations in connection with this matter, which extend over several years, it appears that 99 per cent. of luminous periods and 91 per cent. of ozone periods commence with decreasing readings of the barometer and other conditions of the equatorial current; and that 94 per cent. and 66 per cent. terminate with increasing readings and the conditions of the polar current. Luminous periods commence and luminosity increases in brilliancy on the approach of storms and gales, and ozone periods commence and luminosity increases in quantity under similar conditions. There is, it would appear also from these observations, an intimate connection between the approach of storms, the commencement of luminous and ozone periods and disorders of the nervous, muscular and vascular systems. Here the author gave the dates of many storms and gales, and the occurrence of diseases of the above class, showing their coincidence; and in corroboration of what he had stated, he mentioned the fact that there was a concurrence in the issuing of Admiral FitzRoy's cautionary telegrams and these diseases. He also stated that he views the part performed by ozone in the atmosphere as being similar to that performed by protein in the blood; the latter giving oxygen for the disorganization of worn-out tissues in the animal economy,—the former giving oxygen to the products of decomposition and putrefaction, and rendering them innocuous or salutary compounds. With these views he has used phosphorus as a disinfectant; and from the results he has obtained, he believes that by using ozone artificially formed by the action of phosphorus in localities tainted with the products of putrefaction, just in sufficient quantity to tinge the usual test-paper, all diseases of the pythogenic class would be prevented. Although the data are too few to theorize upon, Dr. Moffat hoped that he would be excused for pushing the matter beyond a simple statement of facts and observations, as many facts had been observed in nature which strongly corroborated all he had advanced. Ozone, he observed, is in all probability formed wherever there is phosphorescence; and this is by no means an uncommon phenomenon. It is seen in life and in death, in the animal and vegetable kingdoms, and in the

mineral kingdom. Here many instances of phosphorescent bodies were enumerated, among which the night-shining Neries was named as becoming particularly brilliant with a direction of wind from points of the compass between east and south; and the fact that the sea becomes luminous on the approach of storms by marine animals floating on its surface was noticed. Many phosphorescent minerals were named; the fluor spar being particularly pointed out as being not only phosphorescent on slight increase of temperature, but as giving off ozone. The author concluded by observing that it is not improbable that atmospheric ozone is formed by the phosphorescence of these and similar bodies, and pointed to the absence of ozone and weak magnetic action during cholera periods, which are periods of non-luminosity, and to the disappearance of cholera with the setting in of the equatorial current, which is ozoniferous and favorable to luminosity. The aurora, the author thinks, may yet be proved to be a display of luminosity.—*Am. Journ. Science and Arts, Nov.* 1862.

PREPARATION OF BISMUTHIC ACID.

By MM. Bœdeker and Diechmann.

When a solution of nitrate of bismuth is treated by a concentrated solution of cyanide of potassium employed in excess, it produces, as is known, a deep-brown powder, and the liquid is colored red.

This brown precipitate, which has heretofore been considered as BiO_4, is in reality hydrated bismuthic acid BiO_5+2HO. It is purified by ebullition and washing in distilled water to remove cyanide of potassium.

The water of hydration is only disengaged at the temperature of 302 F.

This reaction is not produced by the cyanate of potassa which the cyanide usually contains, as the authors tried the pure cyanate without a parallel result.—*From Central Blatt, in Jour. de Pharm. Dec.* 1862.

ON THE PRESENCE OF ARSENIC AND THALLIUM IN THE MEDICINAL PREPARATIONS OF BISMUTH, AND ON A MEANS FOR PURIFICATION.

By W. Bird Herapath, M. D., F. R. S. L. and E.

The recent case of arsenical poisoning in Wiltshire has brought prominently before the public the fact that the processes adopted in the manufacture of the medicinal preparations of bismuth are very imperfect, and permit the presence in those most useful articles in the Materia Medica, of large quantities of a highly dangerous and noxious substance, namely, arsenic in some form or other; it therefore becomes most desirable that the attention of manufacturers should be called to this circumstance, in order that they might produce an article free from such dangerous impurities. Since my return from Hindon, I have examined fourteen different samples of this medicinal agent, amongst which were preparations obtained from the dispensaries of the Bristol Royal Infirmary, the Bristol General Hospital, as well as samples from some of the first pharmaceutical establishments of this city and Clifton also, and in each case I have invariably detected the presence of arsenic. Some of these samples have contained as much as one grain of arsenic in 433 grains of the article examined, others only one grain in 1000 grains; such quantities, although minute, when given in the usual medicinal doses, yet under a similar combination of circumstances to those occurring in the case in question, might lead to very serious consequences, as it would be impossible to establish the fact of a criminal administration of this poison if bismuth in its present impure condition had been administered medicinally.

Some preliminary experiments have shown me that it is possible to remove arsenical impurities by a very simple process, and one which would not add much to the cost of the material. On boiling either of the insoluble salts of bismuth with a sufficient quantity of solution of caustic soda or potassa, the arsenic is quickly removed in the soluble form, and the residue, on treatment the second time with the same reagent, and subse-

quently well washing it by means of large quantities of water, and decantation, is rendered perfectly pure and fit for medical purposes. I am not aware whether this process has been hitherto proposed, but it has succeeded perfectly in purifying some samples of nitrate and carbonate upon which I have tried it in my own laboratory.

The greatest objection to this mode of purification is of course the change which the caustic alkali exerts upon the preparation employed, as the nitrate will be wholly converted into the yellow oxide, whilst the carbonate will be also partially so changed. This process therefore entails the resolution of the oxide in nitric acid, and its renewed precipitation as "Trisnitrate" by the addition of water in the usual manner; whilst the waste acid obtained from this precipitated and purified nitrate may be employed for the resolution of the changed and purified carbonate, whence the bismuth may be again thrown down in the pure form by the addition of carbonate of soda to that solution. Thus, by carefully economizing the nitric acid used in the process of manufacture, very little additional expense would be entailed by following this method of purification. A few words may be advisable upon the best means of detecting and estimating the arsenic in preparations of bismuth, as it is not an easy matter to do so by the plan recommended by Rose, and many chemists may readily overlook small quantities like these by depending upon such a method of proceeding. But reduction by hydrogen gas furnishes us with both a ready method of detection and even of quantitative estimation, and in fact was the plan adopted by me in all these analyses. One precaution is necessary however in the quantitative analysis, in addition to all those which ensure the purity of the acids, zinc, and apparatus employed, which is to select a tube of hard green glass, about a quarter of an inch in diameter; then by means of the blow-pipe draw it out in successive portions, to narrow its calibre and reduce its weight, and for convenience in heating and weighing, to subsequently bend it into a triangular form; and having carefully counterpoised it, now attach it to the hydrogen gas apparatus (furnished of course with an exit tube filled with chloride of calcium) by means of a little tube of india-rubber, and having ar-

ranged proper supports, it only remains to apply heat at three or four portions of the tube simultaneously by separate spirit-lamp flames properly arranged, and of course having previously allowed the air to escape from the apparatus, and ensured the purity of the gas evolved by heating one of the bends of the tube for some time previous to the introduction of the weighed portion of the bismuth to be tested into the tubular funnel of the apparatus, whence it should be carefully washed down into the gas-bottle, by directing a stream of distilled water by a pipette or the ordinary wash-bottle. In this way twenty grains have sufficed for very accurate analysis, as the hydrogen escapes free from arsenic, as may be proved by lighting it at the extremity of the tube and testing it by Marsh's method from time to time in the ordinary way. In the calculation of the percentage, it is necessary to remember that the arsenic is obtained as metal, whereas it existed in the sample as an arsenite, either of lime or bismuth; consequently it must be converted into the theoretical quantity of arsenious acid.

It is generally the case that the evolution of gas stops during some minutes after the introduction of the nitrate of bismuth, probably from the production of ammonia by the reduction of the nitric acid, but on the further addition of hydrochloric acid it goes on as before. In this way three or four films of arsenical deposit are obtained, and in great beauty, from the quantity of bismuth I have already named.

I need scarcely say that the hydrochloric acid employed was proved to be chemically pure and free from arsenic, not only by Reinsch's method, employing electrotypic copper for the purpose, but by the more rigorous method of passing the hydrogen gas evolved by it *during one hour* through a red hot glass tube; this latter method detects a quantity of arsenic perfectly inappreciable by Marsh's usually trusty method of testing for arsenic. The alkaline liquid obtained after thus boiling one sample of carbonate of bismuth, about 1 lb. in weight, has furnished me with evidence of the existence of another metallic impurity in bismuth preparations. This will very probably turn out to be *Thallium*, which I have nearly identified, but I am now engaged in the elucidation of this matter.

The hydrogen gas flame, when a sample of bismuth contain-

ing thallium is tested by Marsh's method in a darkened room' by means of a white porcelain plate, gives a brilliant green light where the flame impinges on the plate; the arsenical flame is violet, and when sulphur is present we have a beautiful blue. I have found that thallium may be obtained as a deposit in the red hot tube like sulphur and of a reddish-brown color. On heating this whilst the current of hydrogen is still passing through the tube, the green flame is again rendered evident, if it had previously disappeared.

The occasional existence of arsenic as an impurity in the bismuth of commerce was a fact well known to me, but it was not until after my return from giving evidence before the Wiltshire magistrates that I became aware of its almost universal presence; and permit me to express my acknowledgments to Dr. B. W. Richardson for having called my attention to this circumstance, and my subsequent experiments have fully confirmed the truth of his observations.

It is not for me to decide whether this was the source of all the poison in the case in question; *however, I think not*, for we should then have to imagine that at least one ounce of impure bismuth had been taken by the patient in order to account for the quantity of arsenic found by me; and, although all the *arsenic had been retained* in the viscera of the deceased, yet, by some extraordinary means, the whole ounce of bismuth had been evacuated with the exception of a mere trace, for scarcely one-twentieth part of a grain remained—a difficulty, which, in my opinion, it is impossible to overcome.

P. S.—Since the above was written I have found three samples of bismuth tolerably free from arsenic—only the most minute traces to be obtained in the tube. These samples were, two prepared by the Messrs. Howard & Sons, and a specimen of carbonate made by Mr. Schacht, of Clifton; all other samples, more than twenty in number, were decidedly very arsenical.—*Lond. Pharm. Journ., Jan.*, 1863.

ON ESCHWEGE'S PURE NAPTHA, AND ITS USE IN THE ARTS AND MANUFACTURES.

By John Tuck.

Wood naptha, pyroxylic spirit, or the hydrated oxide of me-

thyle, C_2H_3G,HO, discovered in the year 1812 by Taylor, forms, as is well known, one of a numerous class of homologous bodies derived from carbide of hydrogen radicals, the most important of which is the hydrated oxide of ethyle, or alcohol.

These bodies differ from each other in their elementary composition merely by a definite number of equivalents of carbon and hydrogen; thus the compound radicals of naphtha and alcohol are respectively methyle C_2H_3, ethyle C_4H_5; and their corresponding oxides, the hydrated oxide of methyle or naphtha, C_2H_3O,HO, hydrated oxide of ethyle or alcohol C_4H_5O,HO; and their other salts differ only by C_2H_2.

One great and distinguishing difference, however, between these two analogous bodies is the mode of their production; naphtha never being produced by any fermentation whatever, while, on the other hand, alcohol is only produced by fermentation in any commercial quantities. They both have many properties in common when *in a pure state*, being limpid, colorless liquids of pungent and agreeable taste, free from the slightest disagreeable odor, and miscible with water in all proportions. The essential oils, resins, some of the alkaloids, and a great number of saline compounds, especially the deliquescent salts, are readily soluble in both; hence their great importance in the arts and manufactures.

As stated before, naphtha is never produced by fermentation, and is only obtained as a bye-product of the destructive distillation of wood, and is found in the liquid products of the distillate, along with acetic acid, acetone, several ethereal liquids, tarry and resinous matters, and oily hydrocarbons, some of which are in a partially dissolved state.

These condensed liquid products, after being allowed to rest some time in a tank or other suitable vessel, separate into two layers by the tarry and resinous matter sinking to the bottom, whilst the spirituous and acid liquor forms a supernatant layer, which is usually drawn off, and in its passage made to percolate, through a filter formed of coarse gravel, by means of which a great portion of the tarry and other matters mechanically suspended are separated.

The next process is to separate the spirituous from the acid

portion of this crude liquor, which is done in two ways ; firstly, by distilling it direct from the crude liquor ; secondly, by neutralizing it first by lime, and then distilling. In both cases, however, heat is applied until about one-fifth of the contents of the still is condensed in the receiver. The weak spirit thus obtained is next subjected to repeated distillation, in order to obtain the spirit in a more concentrated form, and which is finally rectified by distillation with lime, or with a mixture of lime and caustic potassa. The naphtha as thus obtained, and as is usually met with in the market, is colorless, and of a peculiar, strong and disgusting odor, and not at all potable even after very large dilution. For these reasons it has hitherto been of no service in some of the finer requirements of the arts and manufactures; and when formerly used, it was only on account of the enormous price of alcohol in this country, previous to the granting of that great boon, methylated spirit. It is stated on good authority that the United Kingdom produces about 66,000 gallons of naphtha annually. This peculiar, strong, and offensive odor and taste in naphtha is owing to the presence of certain volatile oily hydrocarbons necessarily formed in the process of its manufacture, as may be seen from this rough outline of it, and from which it has hitherto been found utterly impossible to free it, on a commercial scale by any known process. Now, however, such can be done, and to M. Eschwege belongs the credit of having succeeded in removing entirely these oily or other impurities, and of rendering the naphtha *free from odor, potable, and fit for many, if not all, of the purposes to which spirit of wine is now applied.*

This process of purification is effected *without any chemical change whatever taking place, and in a manufacturing point of view can be readily and economically carried out.* Samples of naphtha and various other spirits in their crude state, and after being purified by this process, are to be seen at the present International Exhibition,* Class 5, south-east passage of the Eastern Annexe.

Having, through the kindness of M. Eschwege, had some of his purified naphtha placed at my disposal for examination, I

*This paper was written in October.

found it to be, as stated, entirely free from any disagreeable odor; as odorless in fact as spirit of wine, and quite potable; in order to test which I drank it in one and two drachm doses, diluted with four parts of water, *without experiencing nausea, sickness, or the slightest uncomfortable sensation.* I noticed, however, one thing in connection with it, that it did not taste so fiery on the tongue as alcohol. In order to meet every objection, and as a conclusive proof of the nature of this potable liquid, I submitted it to the action of oxalic acid, and thereby converted it into the beautiful crystals of oxalate of oxide of methyle (MeO,C_2O_3,) and this test must be allowed by all to be a positive proof of its being naphtha.

All of the essential oils and odorous substances used in perfumery are, as far as my experiments have gone, just as soluble in it as in spirit of wine; and some of the perfumes which I have made, using only this pure naphtha as a solvent, have a much finer and more delicate odor, and have even been preferred to others made in the usual way with spirit of wine. I find the following essential oils are as soluble in purified naphtha of specific gravity ·812, and in some cases even more so, than in the usual spirit of wine of commerce 56 o. p.:—Ol. Anethi, Anisi, Anthemidis, Bergamotæ, Cajeputæ, Carui, Caryophylli, Cassiæ, Cinnamomi, Citronellæ, Crotonis, Cymini, Geranii, Juniperi, Lavandulæ, Limonis, Menthæ, Origani, Pulegii, Rhodii, Rosmarini, Sabinæ, Verbenæ.

I think the above facts are quite sufficient to prove that we have in pure naphtha a new and highly valuable menstruum for use in perfumery, and in making the various essences for flavoring and other purposes, and which it is very probable will prove as great a boon to this, as methylated spirit has to other arts and manufactures. It is also well adapted for making the finer kinds of spirit varnishes, to be used in cases where even the little odor of methylated spirit is objectionable, if anything freer from odor and as effectual could be obtained at a reasonble price, and in cases where spirit of wine is often even now used, such as re-polishing furniture in inhabited houses, in varnishing walls to prevent damp coming through, for mixing with water to form evaporating lotions in the sick room, for burning in lamps as a cleanly and cheap source of heat in experiments, etc., for

singeing horses in cases where the odor of methylated spirit is objectionable; and, although I have made no experiments on this subject, I should think it was well adapted for making transparent soap: and there is no doubt that it will be used for numberless purposes which experience will prove it to be adapted for.

As regards its use in pharmacy, I see no valid objection against its being used in the manufacture of all tinctures (as its solvent powers are almost identical with spirit of wine,) and in every case where spirit of wine is now used either as a solvent or from its preservative effects; but I wish it to be distinctly understood that I do not advocate its use in any one case, until official permission is given for using it.

Since writing the foregoing, I find that Mr. Draper, of Dublin, has published a paper in this Journal, on the "Purification of Pyroxylic Spirit," in which he states, "I am of opinion that, in its present form, the patent process just described is not adapted to the purification of wood-spirit on a manufacturing scale.' This paper called forth a letter from M. Eschwege in the "Chemical News" of November 15th, in which he states that the cost of purification will be under sixpence a gallon of full strength on a large scale, and he has offered, to quote his own words, "with a view to facilitate researches into its properties, to place at the disposal of any one scientific institution not too distant from the British Museum, an apparatus which I had made, to come to practical results, and to have there purified, under my directions, any quantity wanted merely for scientific purposes.—*Lond. Pharm, Journ., Jan.*, 1863.

Wilton, near Salisbury, Nov. 19th.

A NEW DIALYSING MEDIUM.

M. Ern. Guignet has experienced some difficulty in the employment of parchment paper as a dialysing medium in certain cases, in which it is acted on by the solutions. He appears to entertain some doubts of the truth of Professor Graham's proposition, that the parchment paper is actively concerned in the result by virtue of its colloidal property of becoming hydrated, and has sought to obtain some other substance which should admit of more general application. The medium which he recom-

mends is *porous or unglazed earthenware*, such as is used in the construction of porous cells for batteries; in fact, he seems to have used battery cells in some of his experiments. He states that, with the employment of this medium, he has obtained all the important results described by Professor Graham, together with several which would have been impossible to realize with parchment paper. The following are some of his experiments, which are interesting and suggestive, although not sufficiently numerous or precise to be conclusive:—A porous vessel filled with pure water was placed in a solution containing gum and sugar; at the end of twenty-four hours a great part of the sugar had traversed the porous vessel and passed into the water, but not a trace of the gum.

Caramel and bichromate of potash were in a similar manner rapidly separated; the salt passing through the porous vessel into the pure water, and leaving the caramel behind. A drop of the mixed solution allowed to fall upon the porous porcelain, gave a brown spot, surrounded by a yellow circle of bichromate, which the author considers evidence of the greater diffusibility of the salt.

A porous vessel of pure water was placed in an ammoniocupric solution of cotton; the water became blue, while the cotton remained in the outer liquid.

Experiments were also made to replace water by other liquids, such as bisulphide of carbon, and essence of turpentine. Iodine, sulphur, and naphthaline pass through porous earthenware with very different degrees of rapidity, when dissolved in bisulphide of carbon, the first being much behind the others.—*Phar. Jour. London, January*, 1, 1863.

ON VARIATIONS OBSERVED IN THE WATER OF HYDRATION OF SULPHATE OF QUININE.

By MM. E. Millow and A. Commaille.

The authors state, that the most recent treatises on chemistry give an imperfect and erroneous idea of the state of hydration of the sulphate of quinine of commerce.

The formula of the anhydrous sulphate of quinine is thus expressed :—

$$2(C_{40}H_{24}N_2O_4,HO),SO_3.$$

The salt of this definite composition (which the authors have verified with great care) is not obtained in the drying ovens where the commercial sulphate of quinine is desiccated, but it may be always obtained by exposing the salt of commerce in glass tubes for five hours to a temperature of 120° Cent. The salt undergoes no alteration even if the temperature be raised to 155° Cent. Five different commercial samples of sulphate of quinine gave the following percentages of water :—

1	. . . . .	5·16 per cent.
2	. . . . .	5·71 "
3	. . . . .	11·15 "
4	. . . . .	11·79 "
5	. . . . .	13·30 "

The authors recommend that Pharmaceutists who consume large quantities of this expensive febrifuge should make known the amount of water they tolerate in it, and this figure admitted, the standard thus formed should be always appealed to, and the manufacturers controlled. They then show the large amount of water that may be introduced into the salt without altering its appearance. The commercial salt was submitted to repeated crystallization, and its purity established by analysis; it was then introduced into different atmospheres, each maintained in a particular hygrometric condition; for example, over sulphuric acid, either more or less concentrated or saturated with humidity, at temperatures varying from 15° to 18° Cent.

Placed over oil of vitriol, the sulphate of quinine undergoes but an incomplete desiccation, there yet remains a portion of water which is lost at 120° Cent.; three experiments determined this percentage of water at

1	. . . . .	4·64 per cent.
2	. . . . .	4·71 "
3	. . . . .	4·84 "
Mean	. . . . .	4·71 "

The desiccation does not proceed further if the temperature does not exceed 17° Cent.; but if this heat be exceeded, a further diminution of the percentage of water occurs. The air

in which the salt was being dried over oil of vitriol having acquired a temperature of 30° Cent., the proportion of water in the salt was reduced to 0·93 per cent. It is presumed that the salt maintained at this temperature for one or two months might become anhydrous. Kept several days over sulphuric acid containing five equivalents of water, at a temperature below 15° Cent., the salt retained a quantity of water represented by the following numbers:—

1	5·84	per cent.
2	5·99	"
Mean	5·91	"

These conditions correspond to a tension of 2·674 m.m., and indicate a very dry atmosphere. Over sulphuric acid containing eighteen equivalents of water, at 15° Cent., corresponding to a hygrometric tension of 10·6 m.m., different samples of sulphate of quinine, containing from 10 to 18 per cent. of water, did not sensibly vary in weight.

If anhydrous sulphate of quinine, dried at 120° Cent., and commercial varieties be placed in a very humid atmosphere at 15° to 18° Cent., they progressively increase in weight. Under these circumstances the anhydrous salt took up, in five days, 28·77 per cent. of water.

Another sulphate of quinine containing 18 per cent. of water, and of which the weight did not vary when the salt was exposed over sulphuric acid containing eighteen equivalents of water, absorbed a further quantity of water, which in ten days amounted to 14 per cent., making a total of 32 per cent. of water finally contained in the salt. Another sample which, having been exposed to sulphuric acid containing five equivalents of water, only retained 5·91 per cent. of water, took up 33 per cent. more in eight days, making a total of 39 per cent. of water in the salt. Notwithstanding the great vaaiations thus produced in the chemical and therapeutical value of sulphate of quinine, the appearance of the salt is not sensibly changed.

These experiments appear to show that the state of hydration of this salt is not definite or capable of expression in equivalents. This is a case not without its analogues. It is observed

in several minerals, oolites particularly, where it is almost impossible to fractionize the water at different degrees of the thermometer, so as to express the quantity in a regular formula.

Whatever may be the value of these remarks in theory, they have an important practical bearing, showing, as they do, how large an amount of water may be contained in sulphate of quinine, otherwise pure, without altering sensibly its physical characteristics, of the presence of which, therefore, the appearance of the salt affords no indication.—*London, Phar. Jour. January* 1, 1863, *from Répertoire de Chimie.*

ON A NEW PREPARATION OF PURE OXYGENATED WATER.

By M. Duprey.

By passing a very rapid current of pure carbonic acid into distilled water, and adding at intervals binoxide of barium, perfectly pure oxygenated water is obtained.

When the quantity of carbonate of baryta is sufficiently large to obstruct the passage of the gas, the clear liquid, containing all the oxygenated water, must be decanted, and the current of carbonic acid again passed into it. As soon as more binoxide of barium is thrown in, a fresh quantity of oxygenated water is formed. In this way we obtain water strongly charged with perfectly neutral and pure oxygenated water, which can be concentrated under an air pump. Care must be taken to maintain a sufficiently rapid current of carbonic acid, so as to be always in excess of the small and gradually added quantities of binoxide of barium, which must, moreover, be finely powdered, as large pieces escape decomposition.

In all my experiments, the carbonic gas has been exactly washed by passing through flasks containing carbonate of lime. It is then evident that to its action alone is to be attributed the production of oxygenated water; and the experiment shows, moreover, that it can be obtained as well with oxacids as with hydracids.

The best re-agent I have been able to find for oxygenated water is decidedly permanganate of potash, which, when poured

into water containing even a very small portion of oxygenated water, disengages all its oxygen. This body serves to estimate oxygenated water, the phenomena of decoloration being very apparent.—*Lond. Chem. News, Dec.* 1862, *from Comptes-Rendus.*

ON THE PRESENCE OF PIPERINE IN THE SCHINUS MOLLIS.

By M. Landerer.

The berries and leaves of the *Schinus mollis*, one of the most graceful of the Eastern terebinthenaceæ, have a burning flavor, similar to pepper, whence it has obtained among the natives the name of "pepper tree." Every part of this vegetable is filled with a milky, very acrid juice. The leaves bruised and applied to the skin produce the effect of a strong sinapism.

In searching for piperine in the berries, which resemble Indian pepper, M. Landerer treated them with alcohol, density 0·840, expelled the alcohol by distillation, and digested the residuum twice with a potash solution to dissolve the resin. The portion which resisted the potash was redissolved in alcohol, and the liquid left to spontaneous evaporation. The product, purified by the repeated action of animal charcoal and several crystallizations, possessed all the properties of piperine. M. Landerer admits, however, that this result needs confirmation.—*Lond. Chem. News, Dec.* 1862. *from Wittstein Wiertejahr, xi.* 72.

ON NITRONAPHTHALINE, NAPHTHYLAMINE, AND ITS COLORED DERIVATIVES.

By M. Z. Roussin.

It is well known that the hydrocarbon called benzol, by fixing the elements of hyponitric acid, forms nitrobenzol. United in this way as an acid molecule, nitrogen, by an intelligible reduction, may assume an alkaline character, and remain in the compound. The new base, aniline, is then obtained, the mobile elements of which adapt themselves readily to the phenomena of oxidation, or of substitution.

Naphthaline gives two parallel derivatives, nitronaphthaline and naphthylamine. It was interesting to ascertain whether this latter substance would equally produce the colored derivatives analogous to those of aniline. A greater importance was given to this research, seeing the high degree of condensation of these substances, which naturally led me to expect greater stability in the compounds. I first gave my attention to producing these two substances easily and cheaply; first, nitronaphthaline, and then naphthylamine.

Preparation of Nitronaphthaline.—Into a globe of 8 litres capacity introduce 1 kilogramme of ordinary naphthaline, and 6 kilogrammes of commercial nitric acid, and dispose the apparatus over a bath of boiling water. The naphthaline first melts and floats on the surface. Shake the globe briskly from time to time. Some red vapors will be disengaged, and the oily layer will sink gradually to the bottom. The operation is then over. Hasten to decant the floating acid, and pour the oily matter into an earthen pan, where it will quickly congeal. At the moment of solidifying, constantly shake it, and wash it several times to carry off the excess of acid. To purify the nitronaphthaline it is sufficient to melt it, and to compress it strongly when cold. Melted nitronaphthaline can be filtered through paper, which it traverses as easily as water. Solid nitronaphthaline is of a reddish color; but the powder has a beautiful yellow tint. Nitronaphthaline, which has been sufficiently compressed so as to free it from a red oil which impregnates the mass, is very pure. Almost the theoretical quantity is obtained. The acid mother-water of this preparation contains various products, and especially white binitronaphthaline, which often crystallizes on cooling. The mother-waters retain a large quantity of nitric acid, colored yellow, and capable of being utilized.

Preparation of Naphthylamine.—Introduce into a balloon six parts of commercial hydrochloric acid, one part of nitronaphthaline prepared by the above process, and to this add a quantity of granulated tin, so as to reach the top of the mixture. The balloon should not be more than half full. Place the apparatus in a water-bath, and shake it from time to time. In a

few seconds an energetic reaction takes place; the nitronaphthaline disappears, and the liquid becomes limpid, though of a brown color. Decant the liquid into a sandstone vessel, containing a mixture of two litres of commercial hydrochloric acid, and one litre of water, where the crystallization of the hydrochlorate of naphthylamine soon solidifies the whole. When quite cold put it to drain on a coarse linen, and then forcibly compress it. To purify this salt it is sufficient to dry it thoroughly, to dissolve it in boiling water, to add sulphide of sodium to precipitate the tin, and to filter the liquid through wet paper, which retains a tar-like matter. The hydrochlorate of naphthaline crystallizes by cooling. Strain, compress, and then heat it in a stove to +100°.

Hydrochlorate of naphthylamine easily sublimes like benzoic acid or sal ammoniac. It is then very light, and in brilliant white flakes of great purity.

The mother-water of the last crystallization of hydrochlorate of naphthylamine will serve for the preparation of naphthylamine itself, or it may be otherwise utilized.

The preparation of these various products by these processes is so simple, that one day only is required to obtain several kilogrammes of hydrochlorate of naphthylamine, beginning with the naphthaline itself.

Among various trials I have made of naphthylamine for dying purposes, the two following will give the best idea of the important part which these products may be made to play:

Mix two limpid and colorless solutions, one of hydrochlorate of naphthylamine, the other of nitrite of potash, and a beautiful red precipitate is produced, insoluble in water. The application of this reaction to dying purposes is extremely simple. It is only necessary to plunge the specimens of silk or wool into a solution of hydrochlorate of naphthylamine, heated to + 50°, to wring them out, to get rid of the excess of liquid, and to plunge them into a cold and weak solution of nitrite of potash. Then wash them in plenty of water, and put them into alkaline water. According to the concentration of the liquids and their degree of acidity the shades of color obtainable vary from a rose-color to a deep-red chestnut. The chief character-

istic of this coloring matter is its fixity. It is unalterable by exposure to light, unattackable by decolorizing chlorides, sulphurous acid, alkaline solutions, and acid liquids. The strong concentrated acids turn this color to violet, whilst the stuff itself remains impregnated with acid. The tint is restored in all its integrity, by simply washing in water. This color, by its exceptional stability, reminds us of alizarine. It is sure to be quickly appreciated by dyers.

When rough hydrochlorate of naphthylamine, which contains perchloride of tin, is heated in an oil bath to about + 230° to + 250°, there remains in the retort, besides a large proportion of sublimed organic salt, a brilliant blackish mass.

This matter should be finely powdered, and treated several times with boiling water, to take away all soluble portions. After drying, treat it with boiling alcohol, which almost completely dissolves it, meanwhile developing an intense red-violet color. When applied to stuffs, this color is unaffected by the sun, acids, or alkalies. I hasten to make these results public, and intend to continue my investigations.—*London Chem. News, Dec. 13th*, 1862, *from Comptes Rendus.*

ON OAKUM AS A SUBSTITUTE FOR LINT.

By Dr. Ruschenberger, U. S. N.

[Dr. R. after recapitulating the chief points of Dr. Sayre's paper, at page 411 of our September number, remarks as follows.—Ed.]

It may be fairly inferred that, in the opinion of Dr. Sayres lint possesses the same degree of capillary force, as cotton, either free or strongly compressed in a bale, and that oakum has much greater capillary power than either cotton or lint, and for this reason he suggests that oakum should be substituted in the place of lint, not in all cases or under all circumstances, but only in gunshot and other suppurating wounds.

Some may ask, what is oakum?

Hemp is spun first into yarns which are imbued with about fifteen per cent. of tar, at a high temperature, and then these yarns are laid or twisted into rope. The tar is applied for the

purpose of diminishing as far as possible the capillary force of the rope, and, by thus excluding the moisture to which it is constantly exposed, of retarding its decay. But in spite of the presence of the tar, rope is found to lose its tenacity or strength in the course of from one to ten years, according to the uses to which it may be applied, and being no longer serviceable as a rope, it is cut up, and shredded and converted into oakum which is used for caulking or filling all seams or joints in ships, for the purpose of excluding moisture.

Tow is the refuse or scrapings of hemp or flax.

In order to obtain an idea of the comparative absorbent power or capillary force of oakum, cotton, lint, and tow, small parcels of these articles, of ascertained weight and dimensions, were gently placed on the surface of the water in a basin, and carefully weighed again after removal. The weight of water absorbed by each, thus ascertained, is stated in the following table:

	Weight.	Dimensions.	Time in contact with water.	Weight of water absorbed.
Cotton (wool) . .	40 grs.	3 in. diam.	1 hour 10 m.	8 grs. = 1-5
Oakum . . .	"	2½ "	do. do.	10 " = ¼
Tow (from hemp)	"	2½ "	do. do.	250 " = 6.25 tms.
Coarse Lint (shoddy)	"	2½ "	1 minute	280 " = 7 "
Scraped Lint . .	"	2½ "	instantly	298 " = 7.45 "
Patent Lint . . .	"	1¾ by 3 in.	4 minutes	289 " = 7.47 "

Forty grains of cotton submerged and slightly squeezed under water for a few seconds, was found to retain without dripping, 270 grains; and an equal weight of oakum treated in the same manner, only 94 grains of water. The oakum retained little more than twice its weight, and the cotton nearly seven times its weight of water.

The inference from these experiments is that the capillary force of patent lint is nearly thirty times, and that of tow twenty-five times greater than oakum: and the capillary force of oakum is only one fifth greater than that of cotton. Oakum absorbed one-fourth, and cotton one-fifth of its weight: but tow 6.25 times, coarse lint 7 times, scraped lint 7.45 times, and patent lint 7.47 times its weight of water.

If the property of capillary force alone is to determine the

choice of tissue or substance for covering suppurating wounds, any description of lint or tow is to be preferred to oakum.

Two has been long employed as an outside dressing or recipient of profuse discharges; and also as a swab in cleansing offensive suppurating wounds, where sponge was not sufficiently abundant to be expended in this way. The objection to tow is, that there are apt to be sharp or hard spiculæ adhering amongst its fibres, which give pain when brought against a sensitive surface; but this objection may be obviated by carefully selecting and carding the substance. A better substitute for sponge for cleansing purposes in surgery is cotton wool, which, saturated with soap suds, or simply with tepid water, and held in a dressing forceps, forms an admirably soft application that may be used where the finest sponge would be found by the patient rough and harsh. Indeed, considerations of cleanliness and of avoiding the diffusion of morbific matters from patient to patient, suggest that sponge used once as a detergent implement should not be used in the case of any other individual, and not too often on the same person. Cotton or tow forms a detergent implement so cheap, that it may be renewed at every dressing, and ought to be substituted for sponge without any reference to cost, for cleansing purposes.

It is said that cotton or lint placed over a suppurating wound serves to *prevent* the escape of pus, and that oakum should be substituted. But, it seems that oakum as well as lint may block the way and hinder the flow of the escaping liquids, if not removed when saturated. Then why should a copiously discharging wound be enveloped in any capillary material; why not permit the discharge to flow without impediment of any kind? Any contrivance which would keep the wounded part at a normal temperature, whether in the form of oiled silk, or other tissue not readily permeated by moisture, or in shape of a simple veil or shield from flies in hot weather, might prove more salutary than the effects of a bunch or pledget of wiry oakum secured over it by bandage or otherwise.

Supposing that oakum possesses all the qualities claimed for it in the instances specified, it cannot be regarded as a substitute for patent lint, because there is often necessity for just

such a pliant tissue to serve as the vehicle in the application of ointments to morbid surfaces—such as blisters, for example.

Substitutes are almost always defective expedients. Whether they are adopted for parsimony, poverty or other reason, they rarely satisfy the requirements they are employed to meet. The workman who uses implements in all respects adapted to his vocation produces more perfect results than he who labors with a paucity of tools, and hence, driven to expedients, is compelled to require from his awl the work of a gimlet.

Oakum is, doubtless, applicable as a substitute to some ends. It may answer as an external dressing, a mere recipient of liquid discharges; but for such purpose, as it costs much more and has less capillarity, it is a poor substitute for tow. Its application to the uses to which patent lint is especially adapted could be suggested only where no soft tissue is procurable. Canton flannel would answer the place of patent lint better than oakum; but comparing their adaptability to the object in view, the propriety of substituting Canton flannel, at thirty-five cents the square yard, for patent lint, while this is procurable at forty cents, does not commend itself to notice.—*Lond. Pharm. Journ.*

ON THE OCCURRENCE OF SILICA IN THE HIGHER PLANTS.

The existence of considerable quantities of silica in the bamboo, in the equisetums, in the grasses and sedges, has long been known.

The numerous analyses of the ashes of plants which we now possess, indicate that this substance is an invariable ingredient of the higher plants when they grow in natural soils. We find it in fact in nearly all parts of agricultural and forest plants. The seeds of the bean, quince, lemon, madder and flax are among the few parts of plants in which it has not been detected.

In the ash of the *wood* of most common forest trees, it ranges from 1 to 3 per cent; in the *Carpinus betul* it is as high as 4·97 per cent, (Fr. Schulze): in the *Pinus sylvestris*, 8·39 per cent, (Levi): in the *Pinus picea*, 20·01 per cent, (Hertwig.)

In the ash of *leaves* silica is more abundant than in that of wood. The ash of turnip leaves contains 8 to 10 per cent, (Anderson); of *Pinus picea*, 10·79 per cent, (Fr. Schulze); of

the hop, 12·14 per cent, (Nesbit); of tobacco, in one case, 17·65 per cent, (Fresenius and Will); of the beech, *Fagus sylvatica*, 26·7, and the Oak 30·94 per cent, (Henrici). The ash of oat leaves contains 11·42 per cent, (Arendt), 16·58 per cent, (Norton).

In the *bark*, *rind* or *cuticle* of plants, silica appears to be most abundant. In the ash of the bark of the beech there is 17·97 per cent, (Wilhelmi), in *Prunus avium* 21·3 per cent, (Hoffmann). The most remarkable dicotyledonous plant in this respect is the *Hirtella silicea* or Cauto tree of South America. Henrici found in the bark of this tree 34·4 per cent of ash of which 96·17 per cent was silica. The bark is very firm, harsh and difficult to cut, like a soft sandstone. Crüger states its ashes are used by the natives of Trinidad to mix with clay for making earthen vessels.

In the ash of the rind of the bamboo there is 70 per cent; in that of the *Chamerops excelsa* 90 per cent; in the ash of the *Equisetum hyemale* 97·52 per cent of silica, (Struve). In the bamboo we have, so to speak, silicious calculi—the Tabashir.

As to the *condition* of the silica in the plant, Arendt has shown that in the oat plant it is to a great degree insoluble (see table below), and his investigations of the oat in different stages of growth, further show that silica when once deposited in the tissues, suffers no subsequent change of place, as happens with other ingredients.

The *position* of silica in the plant is seen, from the percentages above quoted, to be, in general, at the surface. Although it is found in all parts of the plant, yet the *cuticle* is usually richest, and this is especially true in cases where the content of silica is large. Davy in 1799 drew attention to the deposition of silica in the cuticle, and announced the idea that it serves the plant an office of support similar to that enacted in animals by the bones.

The silica assumes the form of the cells in the cuticle of the Equisetums and Deutzias, is well known. Kindt finds that the hairs of nettles, Wicke that the hairs of hemp, hops and other rough-leaved plants are incrusted with silica. According to Wicke the leaves of many forest and fruit trees when cautiously incinerated, leave a silicious skeleton that preserves the form of the epidermis. Mohl has minutely studied the position assumed

by silica in many plants. He finds that in some leaves, only the upper; in others, both sides contain silica in the epidermal cells. In some the hairs alone, in others the hairs and epidermal cells also, are incrusted with this body. In *Deutzia* and *Ficus elastica* the vascular tissue is incrusted with silica. Wicke, found that the bark of the beech and maple, *Acer pseudoplantanus* are coated with silica. This is especially true of the beech which is literally enveloped in a silicious shirt of mail, whence the smooth and undecayed surface which its trunk presents. From the inner bark—bast-fibre—of flax, Wicke obtained after destruction of the organic matter, well characterized elongated cell-skeletons of silica. In the ashes of old linen he found 28 per cent of this substance. In the fibers of Manilla hemp, *Musa textilis*, Aloe hemp, *Agave Americana*, New Zealand flax, *Phormium tenax*, all tenacious textile materials, Wicke found as in flax the entire cells incrusted with silica. In cotton fibre it is wanting. In jute, *Corchorus textilis*, some cells are partially incrusted. Wicke concludes that the durability of textile fibres is to a degree dependent on their content of silica.

The *function* of silica appears to be, in cases of the grasses, sedges and equisetums, to give rigidity to the slender stems of these plants, and enable them to sustain the often heavy weight of the fruit. Two circumstances, however, embarrass the unqualified acceptance of this notion. The first is, that the proportion of silica is not greatest in those parts of the plant which would most appear to require its presence. Thus Norton (this Journal, [2,] vol. iii. pp. 235–6) found that in the sandy oat the upper half of the dry leaf yielded 16·22 per cent ash, while the lower half gave but 13·66 per cent. The ash of the upper part contained 52·13 per cent of silica, while that from the bottom part had but 47·79 per cent of this ingredient. According to Arendt (*Das Wachsthum der Haferpflanze*, p. 180) the different parts of the oat contain the following quantities of silica respectively:

Amount of silica in 1000 parts of dry substance.	Removed by water.	Insoluble in water.	Total.
Lower part of the stem,	0·33	1·41	1·74
Middle part of the stem,	0·30	4·82	5·12
Upper part of the stem,	0·36	13·02	13·38
Lower leaves,	0·86	34·37	35·23
Upper leaves,	0·52	43·35	43·87

We see then plainly that the upper part of the stem and leaves contain more silica than the lower parts, while the lower parts certainly need to possess the greatest degree of strength.

In the second place the great variableness observed in the same plant, and in the same part of the plant, as to the content of silica, would seem to indicate that this substance is to some degree accidental.

In the ashes of ten kinds of tobacco leaves, Fresenius and Will found silica to range from 5·14 to 18·39 per cent.

The analysis of the ash of 13 samples of pea-straw, grown on different soils from the same seed during the same year, under direction of the "Landes Economie Collegium" of Prussia, gave the following percentages of silica, viz: 0·56; 0·75; 2·30; 2·32; 2·80; 3·29; 3·57; 5·15; 5·82; 8·03; 8·32; 9·77; 21·35. Analyses of the ash of 9 samples of colza-straw, all produced from the same seed on different soils, gave the following percentages: 1·00; 1·14; 3·02; 3·57; 4·65; 5·08; 7·81; 11·88; 17·12.—*Journal fur prakt. Chem.*, xlviii. 474–7.

Such instances might be greatly multiplied, and they have conducted to the opinion that a part of the silica is accidental, a notion further sustained by the fact observed by Saussure, the earliest investigator of the composition of the ash of plants (*Recherches sur la Vegetation*, p. 282), that plants raised on a silicious soil are in general richer in silica than those grown on a calcareous soil. Norton found in the chaff of the Hopeton oat from a light loam 56·7 per cent, from a poor peat soil 50·0 of silica, while the chaff of the potato-oat from a sandy soil gave 70·9 per cent.

Knop has recently published an account of the production of a maize plant that yielded 140 ripe seeds, and had a dry weight of 50 grms. in a medium so free from silica that a mere trace of this substance could be found in the root, but half a milligramme in the stem, and 22 milligrammes in the 15 leaves and sheaths. It was altogether absent from the seeds.

The ash of the leaves of this plant thus contained but 0·54 per cent of silica, and the stem but 0·07 per cent. Way and Ogston found in the ash of maize, leaf and stem together, 27·98 per cent of silica.

Knop is inclined to believe that the little silica he found in

his maize plant was due to dust, and did not belong to the tissues of the plant. He remarks, "I believe that silica is not to be classed among the nutritive elements of the gramineæ, since I have made similar observations in the analysis of the ashes of barley."

Knop does not inform us as to the firmness of the stem of this plant. It would seem, however, that while silica is not essential to the nutritive process in vegetation—is not required for the perfect elaboration of all the cells and organs of the plant—it is useful or even needful to consolidate the tissues, and thus to insure the vegetable structure against mechanical injury. The fact of its presence in variable amount and its most abundant occurrence in the upper and outer parts of the vegetable structure would indicate that the plants which contain it in large quantity oppose in their root surface no obstacle to its entrance, and that within the plant it obeys to a great extent the ordinary laws of diffusion, until it is made insoluble by losing the colloid and assuming the crystalloid condition; or until it is arrested by the plant-tissues in a manner similar to that by which fabrics of dead cellulose attach to their surfaces the ingredients of mordants and dyes; or, finally, until it is left in the cuticular cells as a simple residue of the evaporation of the water that is perpetually steaming from the soil through the plant into the atmosphere.—S. W. J. *Am. Journ. Science and Arts, Jan.* 1863.

DISCOVERY OF ANTIMONY IN NEW BRUNSWICK.

(Extract of a letter to Prof. SILLIMAN, Jr., dated University of New Brunswick, Fredericton, Dec. 9th, 1862.)

My dear Sir:—In answer to your enquiries with regard to the deposits of antimony recently discovered in this Province, I take pleasure in sending to you the following remarks upon the principal locality, kindly furnished to me by Mr. Edward Allison, the present owner of the district where the vein occurs. I repeat the description in Mr. Allison's own words:

"The lode of antimony, recently discovered, occurs in the Parish of Prince William, about 20 miles above Fredericton, on the S. W. side of the St. John River. From the river the

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"The lode of antimony, recently discovered, occurs in the Parish of Prince William, about 20 miles above Fredericton, on the S. W. side of the St. John River. From the river the

rise is gradual till it reaches the summit of the water shed, say from 300 to 400 ft., when the ground falls away towards Lake George and the Pokiok River. The soil of this slope is good agricultural ground, and free from rocks, but near the summit a band of primary rocks protrudes through the soil, as is shown particularly where it intersects the highway. This band of rock contains the lode of antimony referred to; its course is nearly N. E. and S. W. It was discovered in loose boulder rocks which had evidently been detached from this projecting ridge, and upon uncovering the rock, the antimony was discovered imbedded in it. This lode we have traced about one-fourth of a mile by trial pits in this line. The rock is uncovered only in a few places, and lies from 2 to 6 ft. beneath the soil. For the above distance we have found the lode to be associated with the rock, and it probably extends farther.

The lode when uncovered appears to be about 2 ft. wide, with a dip of say 45° to the N. In no case has the vein been penetrated more than 6 ft., and in most places merely uncovered to prove its continuation, therefore I can only describe it as it appears under this partial development.

Samples of this ore have been analyzed by Drs. Hayes and Jackson of Boston, and also in England. The results differ considerably, owing no doubt to the difference in the quality of the samples.

The specimen sent to Dr. Hayes was very inferior, carrying with it a considerable portion of the gangue, which was principally quartz with some carbonate of lime. Dr. Hayes' results were 36 pr. ct. of ore. Dr. Jackson's analysis I have not seen, but understand that he returns 78 pr. ct. of metal. This no doubt arises from specimens being carefully selected, and would not show a fair average of the ore. Messrs. Hayes and Jackson return *silver* as a component. The samples sent to England were very inferior, giving a result for antimony rather less than that shown by Dr. Hayes, but including from 3 or 4 to 12 oz. per ton for silver.

I would say that the mine has not been fairly opened, consequently a current opinion of this deposit can scarcely be given, but from appearances already developed I think it promises a large yield of antimony, and possibly more valuable products

may be found in connection with it. About a ton of the ore has been shipped to Liverpool to be operated upon, and we hope that the results will prove satisfactory." * * * *

To the foregoing account of Mr. Allison's, I have only to add, that in the specimens which I have seen, the antimony, which exists in the state of a sulphuret, penetrates the quartz gangue in irregular veins, with little if any crystalline structure. It is quite brilliant when fresh, but quickly tarnishes upon exposure, becoming of a dull grayish-black color.

Antimony has also been found within three miles of the city of Fredericton, close by the river bank, but only in small detached pieces. These, however, indicate the near presence of another vein, whose exact site has not been ascertained. The ground being now clothed with several feet of snow, no further enquiries can be prosecuted during the present season. These specimens are much more highly crystallized than those of Mr. Allison.

I would also say that a specimen of bismuth, said to be from the Province, has been shown me recently, but the facts of its occurrence have not yet been definitely ascertained.

I am very truly yours, L. W. Bailey.

Am. Journ. Science and Arts, Jan. 1863.

CARBAZOTATE OF IRON.

Mr. H. N. Draper gives (*Dublin Med. Press*, Dec. 3, 1862) an interesting account of this new preparation of iron. The following are the more important points:

The mode of preparing it is as follows: Crystals of pure carbazotic acid are digested with an excess of recently precipitated sesquioxide of iron and water at a gentle heat until the acid has disappeared. The whole is then transferred to a paper filter, and when the deep yellow solution of carbazotate has passed through, the residue on the filter is to be washed with hot water until the filtrate becomes colorless or nearly so. The washings being added to the original solution, the whole is evaporated to dryness at a temperature not exceeding 212°.

Physical Characters.—Thus prepared, carbazotate of iron presents the appearance of a reddish-brown amorphous mass,

which, when reduced to powder, becomes lighter in color. Its taste is astringent and intensely and persistently bitter.

The chemical constitution of the salt, Mr. D. thinks, is three equivalents of carbazotic acid ($C_{12}N_3H_3O_{14}$) united to one of sesquioxide of iron.

Physiological Action and Therapeutic Use.—Carbazotic acid and its salts appear to possess very decided tonic and anti-periodic properties, and will most probably prove, on more extended trial, valuable and economical substitutes for quinine. In large doses the acid is poisonous; according to Taylor,* ten grains have sufficed to kill a dog in less than two hours.

In the hands of Drs. Calvert and Moffat,† the carbazotate of iron has proved very successful in the cure of cephalalgia; the same authors have also employed with good effect the ammonia salt in the treatment of anæmia, intermittent fever, and hypochondriasis, and combined with opium and gallic acid in obstinate diarrhœa. They observe that while the acid itself is liable to produce cramps, its compounds with bases are free from this objection. The dose of the salts employed by these experimentalists was from ·05 to ·10 gramme ($\frac{3}{4}$ to $1\frac{1}{2}$ grain) per diem.

More recently, Mr. Alfred Aspland,‡ of the Ashton Royal Infirmary, has, at the request of Dr. Calvert, tried carbazotic acid and its salts on a more extensive scale, and with a success which should encourage further experiment. Mr. Aspland treated forty severe cases of ague, giving the acid in doses of a grain three times a day, gradually increased to four grains at each dose. Some of the patients were relieved in forty-eight hours, while in two cases the treatment had to be continued for nine weeks. Mr. Aspland has also employed the acid with good results in diabetes, in anæmia and prostration from loss of blood in infantile marasmus, in rickets, and as a tonic in cases of debility, and where quinine is usually given; also in dyspepsia and hypochondriasis. He states himself as unable to decide whether the salts of carbazotic acid, or the acid itself acts better, and does not allude to any inconvenience resulting

* On Poisons, p. 793.

† Pharm. Journ., vol. xvi. p. 167.

‡ Med. Times and Gazette, vol. ii. 1862, p. 289.

from the use of either beyond the peculiar coloration of the skin always attending the continued use of this remedy.

The iron salt will probably be found from its ready solubility one of the best forms of administering carbazotic acid, and especially suitable as a substitute for the combination of quinine with ferric salts. It should, on account of its intensely bitter taste, be administered in the form of pills.

A most remarkable result produced by the continued exhibition of this acid and its salts is that the skin and conjunctivæ of the eyes become dyed of a deep yellow hue, and the urine acquires an orange color. This effect is, according to Drs. Calvert and Moffat, generally brought about in a time varying from two to sixteen days after the commencement of the treatment, or when about fifteen grains of the acid have been taken, and they are inclined to attribute the failure of Braconnot in producing this coloration, to the fact that he employed the potash salt, which is almost insoluble. Mr. Aspland, whose experiments have been cited above, finds that the skin becomes most easily tinged in robust subjects, and more in adults than in children. The urine, on the other hand, is more colored in these cases. The skin in the best dyed cases, clears in two or three weeks after the remedy has been discontinued.

Dose.—From half a grain to two grains, gradually increased."—*Amer. Jour. Med. Sci. Jan.* 1862.

SYRUP OF CARBONATE OF IRON.

Mr. H. N. Draper gives (*Dublin Med. Press*, Dec. 3, 1862) the following formula for the preparation of this, which he considers a great improvement upon the usual form.

"Carbonate of iron readily dissolves in simple syrup, and as the sugar exercises a completely conservative influence upon the salt, this is one of the best forms in which it can be exhibited :—

Protosulphate of iron . . .	2 ounces.
Carbonate of soda in crystals . .	2½ "
Water	2 pints.
Sugar	4 ounces.

Dissolve the sulphate of iron and half the sugar in one pint, and the carbonate of soda and the remainder of the sugar in the other pint of water, mix the solutions, allow the precipitate to subside, and decant the supernatant fluid. Then rapidly wash the precipitate by decantation, using for washing the whole of the following solution, but dividing it between two operations:—

Sugar	5 ounces.
Water	20 "

Next digest the washed precipitate in a sufficient quantity of sugar solution of like strength, agitating it repeatedly during some days. When it is all dissolved, add

Sugar	38½ ounces.
Water	19 fluidounces.

Boil to a specific gravity of 1·265 (at boiling point) and flavor with tincture of lemon or orange peel. This syrup contains about ten per cent. of carbonate of iron, is nearly colorless, and without unpleasant taste.

Dose.—One fluidrachm."—*Amer. Jour. Med. Sci. Jan.* 1862.

ON CANTHARIS.

By Franklin C. Hill.

Several species of Cantharis found in the United States, as C. vittata, C. atrata and C. cinerea are known to be at least equally powerful with C. vesicatoria. It is even asserted that they are so much more powerful as to be dangerous, though this is doubtful, the fact probably being that they have been used in a fresher state than that in which the foreign article can be obtained, and, possibly, unskilfully exhibited.

The number of species of this and the allied genera Meloe, Mylabris, &c., distributed over our territory, is very great, but I have failed to find the author, excepting the late Doctor Harris, who has thought their habits and properties worthy of notice, and his observations were necessarily confined to the species of New England.

Audoin has left us (Ann. des Scien. Nat. t. ix.) an invaluable history, commercial, therapeutic, anatomical and social, of the

C. vesicatoria, but as yet we have no naturalist equal to the same labor of love for our native species.

Agassiz complains that our young naturalists study structure and classification to the exclusion of equally valuable branches, and warns them of the injury they are doing to science by it; and Emerson sneers, not without reason, at modern botany, as consisting wholly of Latin names; he might have said, bad Latin.

Since accepting the task assigned me, I have found my time too fully occupied with other matters, to make original observations of any value. In fact but one species, C. atrata, has come under my observation at all.

These may be found at this season in considerable numbers on the blossoms of the solidagos, or on the China asters, which they infest and destroy. From observations made on the species last summer, I should judge that the amatory process, so graphically described by Audoin, is generic, at least the initiatory performances, which were all I saw, were the same.

Commercially the subject is not worth consideration. On the prairies of Illinois I have often held four species in my hand at once, but all that I saw in the West would not amount to more than a few ounces weight, and, were they as plenty as mosquitos, when harvest hands are paid two dollars a day, no collector could compete with the foreign article at present prices.—*From Proc. Am. Pharm. Assoc.* 1862.

ON THE ARTIFICIAL FORMATION OF POPULINE, AND ON A NEW CLASS OF ORGANIC COMPOUNDS.*

By Dr. T. L. Phipson, F. C. S., &c.

The interesting substance, populine, was extracted in 1830, by Braconnot, from the mother-liquors which had deposited salicine, when the latter was obtained from the leaves of the poplar tree, *Populus tremula*. In 1852 Piria showed that in a variety of circumstances populine split up into benzoic acid and salicine. Dr. Phipson shows that salicine and benzoic acid combine, equivalent for equivalent, to form populine,—

$$\underset{\text{Benzoic acid.}}{C_{14}H_6O_4} + \underset{\text{Salicine.}}{C_{26}H_{18}O_{14}} = \underset{\text{Crystallised populine.}}{(C_{40}H_{22}O_{16}+2HO)}$$

* Read before the British Association.

This occurs when the two substances are dissolved together in alcohol, and the solution made to crystallise; the properties of the artificial compound being precisely identical with those of the natural product. Its peculiar taste—acrid and sweet at the same time, reminding us of the taste of liquorice—is characteristic. With sulphuric acid it takes a red color, and with bichromate of potash and sulphuric acid it gives, on heating, salicylous acid. In this combination salicine has lost its bitter taste, which renders it probable that populine is a compound of benzoic acid, sugar, and saligenine; for, when boiled with dilute sulphuric acid, it breaks up into benzoic acid, sugar, and saliretine (saligenine *minus* aqua). The molecule of populine is, therefore, a very complex one; and these kinds of compounds may perhaps be compared to the combinations of two or more salts in mineral chemistry,—for instance, to alum, if we compare the sulphate of alumina to the benzoic acid, the sulphate of potash to the saligenine, and the twenty-four equivalents of water to the sugar.

The author goes on to state that he has obtained similar compounds with tartaric and citric acids. He states that when these two acids are taken in equivalent proportions, dissolved in water, and quietly evaporated, they enter into chemical combination. It is well known that these acids crystallise in two different systems, the forms of which are incompatible; and by evaporating a mixture of them, we should obtain two kinds of crystals if no combination took place; but the author finds that they do not combine, and produce one kind of crystal only, —namely, long, prismatic needles, and when one of these needles is taken and analysed, it is found composed of citric and tartaric acids.

"This combination of citric and tartaric acids," says Dr. Phipson, "is probably only one example of a new class of organic compounds, similar in some respects to populine, which remains to be studied. Already Professor Williamson has shown that the different acetones may be made to combine so as to produce complex acetones. Thus, when valerate and acetate of lime are distilled together in equivalent proportions, we obtain aceto-valerone,—a compound of acetone and valerone, and so on for the others. It is highly probable that other organic

acids, besides benzoic acid, may be made to combine with salicine; likewise, that other bitter principles analogous to salicine may be combined with organic acids to produce substances similar to populine."—*Lond. Chem. News, December* 6, 1862.

ATROPIA PAPER.

This paper is recommended by Mr. Streatfield, "Ophthalmic Hospital Review," as a portable and convenient substitute for the solution of atropia in ordinary use. It consists of green tissue paper, imbued with a solution of the sulphate of atropia, so that a piece one-fifth of an inch square is equal to or contains as much of the salt as a drop, or minim, of the solution of a strength in ordinary use, two grains to the ounce. The paper, soaked in the strong solution, is hung up to dry, and turned about while drying, that the atropia may be equally distributed. The little piece of the paper to be used, of the size above indicated, is taken up on the tip of the forefinger, previously damped; and the patient's lower lid being drawn down, he is told to look upwards, and the scrap of paper is put on the sclerotic conjunction below the cornea almost without the knowledge of the patient; the lid is then let go, and the piece of paper is left between the ocular and palpebral conjunction; a handkerchief is then tied over the eye, that the lids may be closed for a while.—*London Phar. Jour. January*, 1863.

ON AMERICAN TARTAR.

By W. J. M. Gordon, of Cincinnati, Ohio.

At the last meeting, the following question was submitted to me, "What are the probabilities in favor of tartaric acid and tartar becoming commercial products of the Ohio Valley?" There has been no attention given to the deposit of tartar by the wine growers in the Ohio Valley up to the present time, although to judge of representations of those who have wine cellars, a large amount of tartar could be collected. I have determined, as soon as I can ascertain the average value of the tartar produced here, to offer to purchase all that I can obtain; by this means, no

doubt, I shall soon arrive at a definite conclusion, and should it be thought worth while to continue this subject to me, I can at another meeting answer it with some certainty. With this you will find a letter I received from the President of the Wine Growers' Association, under date of April 12th, 1862, which contains some matter of interest.

"Mr. Wm. J. M. Gordon:—

Dear Sir,—Your first communication on the subject of Cream of Tartar produced in the Ohio Valley, addressed to me as the President of the "American Wine Growers' Association," was laid before the Association at the last meeting, and information elicited from the members present. They concurred in the reply that no attention has been paid by wine growers to the manufacture of tartar, or the collection of the crude tartar deposited in their casks.

The customary mode has been, when changing wine from one cask to another, to clean the casks, and no care has been taken of the dregs, or what they considered the useless deposit of tartar in the casks.

We cultivate in Hamilton county about 4,000 acres of grapes. The product of small vineyards are generally sold to dealers in wine the first year after pressing, consequently but a small quantity of tartaric acid would accumulate in the casks. The manufacturers of champagne wine use large quantities of one and two years' old wine, which is taken from the casks and put into bottles; of course this would prevent the accumulation of tartar. The only plan of calling the attention of the wine grower to this subject is to have some authorized person to offer a certain price for the crude tartar, thus by showing the wine grower or wine dealer that some profit may be derived by saving the tartar and the refuse of his wine casks, they might then be induced to collect and save what is now considered useless.

The principal wine growers in this county, and those who have large casks in their wine cellars, are: Longworth, Bogen, Yeatman, Werk, Mosher, Mottier, Duhme, Williamson, Hodge, and others, who might find it to their advantage to save the tartar of their casks, and thus establish a nucleus for enlarging the collection of larger quantities, until some one would be induced to manufacture the cream of tartar sold in the shops.

I believe that this subject is worthy of the attention of the wine growers of the Ohio Valley, and that any mode proposed, by which the wine dealer could see a profit derived from his labor, in saving that which is now thrown away, that he would of course assist in promoting the manufacture of cream of tartar, thus releasing us from a dependence on the wine districts of Europe for this article of commerce.

The destruction of the grapes of this region this season, by the milldew and rot, has discouraged our wine growers, and it is an unpropitious time to suggest experiments, or to undertake any expensive improvements connected with the cultivation of the grape.

I am, very respectfully your obedient servant,

GEO. GRAHAM,
President of the American Wine Growers' Association.

—*From Proc. Am. Pharm. Assoc.* 1862.

RESEARCHES ON HENNA.

By M. ABD-EL-AZIZ HERRAONY, of CAIRO, EGYPT.

The author, a graduate of the School of Pharmacy of Paris, selected Henna as the subject of his thesis. Henna (*Lawsonia inermis*) is a plant known to the people of the East from the highest antiquity. The leaves are employed either as a medicine or in the preparation of certain cosmetics. Its flowers, possessing equal medicinal virtue, are used as an agreeable perfume. They are sold in Cairo, as the lilac is in Paris.

Henna is common in the East Indies at Malabar, Ceylon &c., and in Arabia, Persia, and Egypt, where it is very abundant. The author admits of only one species—*Lawsonia alba*, of which there are two varieties, *L. inermis* and *L. spinosa*. The leaves are employed as a topical application to ulcers of the mouth, and for staining the feet, hands, and hair. This use is perhaps less the result of coquetry, than to avoid certain skin diseases so common in hot countries. The leaves are also used for dyeing light-colored woods of a mahogany color. The fruit is considered emenagogue.

Henna is furnished to commerce in the form of powder. Two

sorts are distinguished; *Henna of Arabia*, and *Henna of Egypt*, the latter least esteemed. The former is often adulterated with sand and Egyptian henna, so as to be about equal in dyeing value to the latter.

The author in his chemical examination has aimed at isolating the active coloring principle. Cold water does not extract it, but it is removed by boiling water. Ether does not remove it, but extracts the chlorophylle. Alcohol of 90 per cent. completely extracts it by percolation; and when the alcohol is distilled off from the tincture, the syrupy residue exhausted by ether, and the residue again treated by strong alcohol, and evaporated, the active matter is obtained.

This principle is brown, of a resinoid appearance, and soluble in boiling water. It possesses the properties of tannin, such as blackening the sesqui-salts of iron and precipitating gelatin. It reduces oxide of copper in Trommer's test, and heat decomposes it with the evolution of crystalline needles, which reduce nitrate of silver. The coloring matter of henna is therefore a species of tannin, and the author has named it *henno-tannic acid.*

The author made various experiments with henna as a dye stuff, for silk and woolen, with results favorable to the permanence of the shades of color produced.—*Jour. de Pharmacie, Jan.* 1863.

ON A NEW METHOD FOR DETERMINING THE NATURE OF A MIXTURE OF COLORING PRINCIPLES.

By M. le Docteur Frederich Goppels-Rœder.
Professor at the University of Basle.

Some time ago M. Schönbein presented to the Société des Sciences Naturelles of Basle some very interesting observations on the different heights to which divers bodies held in solution rise by imbibition in the pores of blotting-paper.

In these facts the author finds the key to a new method of analysis, and, in conjunction with M. Schönbein, has investigated the behavior of coloring matter from this point of view.

Picric acid is remarkable for the facility with which it enters the pores of the paper, and this property distinguishes it when mixed with other coloring matters possessing less power of infil-

tration. Thus, a mixture of picric acid and turmeric in aqueous solution is determined with great ease by the partial immersion of a strip of porous paper. Above the point of immersion three bands will be observable,—the topmost very narrow, containing water only; the central broad, and colored by picric acid; the lowest one also yellow, but deriving its tint from the turmeric. In fact, when the paper is plunged into a potash solution the middle band of picric acid disappears, while the lower one takes a brown tint. It is obvious that the separation is not complete, the lower bands always containing more or less of the principles which have mounted to the upper bands.

A mixture of aqueous solution of picric acid with a very dark solution of sulphate of indigo, producing a beautiful green color, gives on the paper sometimes three, sometimes four bands.

If the liquid is of a free green color, four bands are obtained, namely, the lowest broad and green, next above a narrower yellow band, the third colorless, containing sulphuric acid, as can be proved by a drop of litmus tincture; and lastly, a band of pure water, which is absent if the sulphate of indigo is in excess, for in this case the presence of too large a proportion of acid prevents the separation of the water and acid.

This method is equally well adapted for a mixture of murexide and picric acid. If the proportion of picric acid is very small, there will be formed—1. A lower band, purple and very broad. 2. A middle stripe, narrow and yellow; and lastly, the highest stripe purely aqueous. If, on the contrary, the mixture contains a large proportion of picric acid, the yellow middle band is larger, and the first, instead of being purple, is only reddish-yellow.

Picric acid is found in the same manner when mixed with fuchsine (hydrochlorate of rosaniline).

The existence of picric acid in crude fuchsine has not hitherto been proved, but the results given by this product with the strip of paper show that picric acid usually accompanies the red product.

By the immersion of several millimetres of a strip of filtering paper in an alcoholic solution of pure crystallised fuchsine, the rapid aspiration of the colored liquid is effected.

After the lapse of a few minutes four bands will appear; the highest, containing alcohol only, colorless, the three other colored with various shades of pure red, from light rose to dark, almost black, red. The darkest band will be in the middle. The addition of a little picric acid modifies these appearances, and produces three kinds of bands—1. Dark red and rose colored bands; 2. Colorless bands; 3. A beautiful yellow band, due to the picric acid. In proportion to the increase of picric acid the yellow band broadens, and the red-brown one produced by the fuchsine diminishes.

Crude commercial fuchsines behave in exactly the same way as the preceding mixture. In alcoholic solution they all give, besides the red bands, a larger or smaller yellow band.

Thus the author has undertaken an extensive series of researches both with solutions of pure coloring matters and with mixtures, and he is convinced that this ingenious process will prove very convenient for distinguishing rapidly the nature of coloring matters in mixtures, especially if well-chosen and characteristic reagents are used, so that applied to well-defined bands they will give precise indications of the kind of color isolated by infiltration.

This mode of analysis may also prove useful in medico-legal researches; for instance, in ascertaining the presence of picric acid in beer, or of various coloring principles in wine, syrups, pharmaceutical extracts, * &c.—*Lond. Chem. News, Sept.* 27, 1862, *from Rép. de Chimie pure et Appliquée.*

ON A GREEN COLOR WHICH MAY BE EMPLOYED IN CONFECTIONERY.

The finest green color is formed, as is known, from preparations of copper and arsenic; that of which the formula is here given is devoid of danger, and may replace it. To obtain it, infuse for twenty-four hours 0·32 grammes of saffron in 7 grammes of distilled water. Then take 0·26 grammes of carmine of indigo, and infuse it in the same manner in 15·6 grammes of distilled water. Then mix the two liquids together, and a very

* [M. L. Leroy; of New York, suggested a similar idea for pharmaceutical preparations. See *Amer. Jour. Pharm.*, 1861, p. 93.—Ed. Am. Jour. Ph.]

beautiful green color is obtained, which may be employed for coloring an immense quantity of sweetmeats (10 parts of this solution will color 1000 parts of sugar of a very beautiful green.) This color may be preserved for a long time, either by evaporating the liquid to dryness or by converting it into a syrup.—*Lond. Chem. News, from Journal de Pharmacie et de Chimie*, xli. 286.

STATISTICS OF THE ALKALI TRADE OF THE UNITED KINGDOM, 1862.

Annual value of finished products, £2,500,000*l.*

Weight of dry products, 220,000 tons.

Raw Materials consumed per annum.

	Tons.
Salt	254,600
Coals	961,000
Limestone and chalk	280,500
Pyrites	264,000
Nitrate of soda	8,300
Manganese	33,000
Timber for casks	33,000
Total	1,834,400

Capital employed in the Manufacture.

In land	£235,000
In plant, buildings, &c	950,000
Working capital	825,000
Total capital	£2,010,000

Annual Cost of Material for Repairs.

Stone, bricks, slates, iron, lead, timber, &c. £135,500

Labor, not including Labor in Transit.

	Number of Hands.	Souls.	Annual Amount of Wages.
Directly employed	10,600	53,000	549,500
Employed in getting coals	3,100	15,500	112,840
" making salt	420	2,100	16,380
Getting and breaking limestone	660	3,300	25,740
" pyrites	4,030	20,150	157,150
Felling and sawing timber for casks	330	1,650	10,140
Total labor employed in the manufacture, and in the preparation of raw materials used in it	19,140	95,700	871,750

Weight of Raw Materials and of Finished Products Transported.

	Tons per annum.
By inland navigation . .	481,350
By railway	1,154,300
By coasting vessels . . .	722,300
By foreign-going vessels . .	182,800
Total	2,540,750

Mem.—About one-fourth of the raw materials and finished products are transhipped in transit.

Weights of Waste Products.

	Tons per annum.
Alkali waste, burnt ores, cinders, slag, *debris*, &c. . .	1,273,00
(Of this quantity, about one-third, say 450,000 tons, is transported by railways and canals; the remainder is deposited in close proximity to the various works.)	
Waste acid, muriate of manganese, lime, &c. . . .	2,600,000
Total waste products	3,873,000

Manufactures depending upon the Products of the Alkali Trade.

Soap, Glass, Paper, Cotton, all, Linen, Woolen, Color making. All chemical manufactures of any magnitude.—*Lond. Chem. News, Dec. 6th*, 1862.

Varieties.

Annual Report of the Board of Regents of the Smithsonian Institution for 1861: Washington, D. C., 1862. 8vo. pp. 463.—In his Report to the 'Board' as Secretary of the Smithsonian, Prof. Henry remarks:

"It could scarcely be expected that during the existence of an intestine war, and almost in the presence of two contending armies, the Institution should be able to conduct its affairs with the same persistence and success as in the tranquil years of its previous history. The interruptions and embarrassments, however, although frequent, and in some cases perplexing, have not prevented the continuance of the general operations of the Institution, or the prosecution of most of the special objects which had previously been determined upon as falling within the scope of the plan of its organization."

However this may be, we are struck in examining this report with its great interest as a record of the progress of science, as well as an index of the value of the important achievements made by the Institution itself in furtherance of the beneficent design of its founder to "increase and diffuse knowledge among men."

The Report of the Secretary addressed to the Regents, reviews the present condition of the fund, the income of which has been diminished by non-payment of interest on about $60,000 of bonds of disloyal states, while a substantial addition to the fund has occurred of about $25,000 from the falling in of an annuity heretofore paid to a relative of Smithson, now deceased. While the active operations of the Institution will not be curtailed by the existing state of civil war, no new undertakings of magnitude will at present be begun. The Secretary, as is his custom, reviews the contents of the publications of the Institution for the year, giving an analysis of the concluding paper, discussing the results of Dr. Kane's Arctic observations, and of a series of papers on the meteorological observations made during the voyage of Sir F. L. McClintock in search of Sir John Franklin in the Fox—1857–1859. These papers form part of the XIIIth volume of the "Contributions."

The *Miscellaneous Collections* include works intended to facilitate the study of the various branches of natural history, to give instruction as to the methods of observing natural phenomena, and a variety of other matter connected with the progress of science. Very properly, in view of its great value as a key to the accurate study of Geology, the Smithsonian has published a series of valuable works on Conchology. They are five in number as follows, viz:

1st. Elementary introduction to the study of conchology, by P. P. Carpenter, of England.

2d. List of the species of shells collected by the United States exploring expedition, by the same author.

3d. Descriptive catalogue of the shells of the west coast of the United States, Mexico, and Central America, by the same author.

4th. Bibliography of North American conchology, by W. G. Binney.

5th. Descriptive catalogue of the air-breathing shells of North America, by the same author.

The Secretary announces that the illustrations presented from the wood cuts of the British Museum Catalogue, by Dr. Gray, and designed to illustrate Dr. Carpenter's Elementary introduction, are now ready for distribution to all who have the work in a separate form.

The Smithsonian is also engaged in developing the history of American Entomology in a thorough and systematic manner, the details of which are given in the Secretary's report.

Ethnology also receives particular attention, and a large number of collaborators are engaged in working up this department of knowledge on which indeed the earlier volumes of the Contributions are particularly full.

The system of meteorological observations inaugurated by the Smithsonian at the outset of its career is still maintained, and the 2d volume of the Observations is nearly ready to be issued. The state of war has seriously impaired the receipt of records from the states in rebellion and to a

good degree, too, broken up the system of returns from the military posts of the Pacific coast.

The magnetic instruments sent to Key West have been constantly observed and the photographic records uninterruptedly kept up in spite of their nearness to the seat of war, at the joint expense of the Smithsonian and Coast Survey.

Under the heads of Laboratory, Explorations, Collections of Narural History, Museum, Exchanges, Literary, Gallery of Art, and Lectures, valuable information is given for which unfortunately we have not space.

Since the rendering of the last report two of the Regents have died and the present volume contains eulogies on Prof. C. C. Felton, by Dr. Woolsey, of Yale College, who was elected his successor, and also on Hon. Stephen A. Douglass, by his successor, Hon. Samuel A. Cox, of the House of Representatives of the United States.

The General Appendix contains a number of valuable memoirs, some of them prepared for the Report by their authors, others translated from the French or German. These are preceded by an abstract of the Lectures given before the Institution, by their authors.—*Extracted from the Am. Journ. Science and Arts, Nov.* 1862, *page* 448–9.

Occurrence of crystallized Silicon in Pig-Iron.—Prof. Robert Richter has discovered crystallized silicon in a specimen of crystallized pig-iron from a furnace at Gradaz, (Austria.) Fragments of the iron were treated with dilute chlorhydric acid until all the evolution of gas ceased; the residue was thrown on a filter, washed, dried and then heated in a platinum crucible in a stream of oxygen gas until all the carbon and iron were completely oxydized. The oxydized residue was boiled with concentrated chlorhydric acid, and after solution of the oxyd of iron there remained a quantity of graphite-like scales, which, examined under the microscope had a perfect metallic lustre, and a silver-white color. These scales remained unchanged when heated in oxygen, and were unacted upon when treated with chlorhydric and nitric acids: heated with nitre and carbonate of soda the scales were rapidly oxydized, and on further treatment the product of this oxydation proved to be silicic acid. The knowledge of the occurrence of silicon in pig-iron is a matter of importance for the ironmaster, as this may sometimes be the cause of the difficult welding, and other undesirable properties of some kinds of iron. For this crystallized silicon cannot be removed by the ordinary process of puddling; as has already been shown, it is not oxydized even when heated in oxygen gas. To remove crystallized silicon from iron in the puddling process it would be necessary to add soda, or perhaps litharge, in order to separate it.—*Am. Journ. Sci. and Arts, Jan.* 1863, *from Berg. u. Huttenmäannisches Jahrbuch der k. k. Montan-Lehranstalten zu Leoban und Przibram*, xi. 289.

G. J. B.

On the preparation of Ozone.—SCHÖNBEIN has given a method of obtaining ozone (—O) in comparatively large quantities and with great facility. Chemically pure, finely pulverized hypermanganate of potash is to be dissolved in pure sulphuric acid of density 1·85 [HO,SO_3], so that the liquid is opaque and has a deep olive-green color. The solution is to be introduced into a flask with two necks, arranged in such a manner that finely pulverized peroxyd of barium may be introduced at pleasure and the gas evolved collected over water. The gas obtained in this manner possesses all the properties of ozone as obtained by the slow oxydation of phosphorus or by electrolysis. Taken into the lungs it produces contraction of the chest and catarrh. It destroys organic coloring matters with the greatest energy; burns pyrogallic acid completely to carbonic acid and water; does not combine with water to form HO_2, but reduces peroxyd of hydrogen to water, losing its smell and power of oxydation; it oxydizes lead, silver and arsenic in the cold; liberates iodine from metallic iodids; oxydizes the protoxyds of lead and manganese to peroxyds; converts sulphids into sulphates, and changes ferrocyanid to ferridcyanid of potassium. The gas thus possesses all the properties of ozone: it is however only a mixture of a small quantity of ozone with a large quantity of neutral oxygen. The author remarks that it is only the green solution of the hypermanganate which yields ozone in the above process. When the sulphuric acid is so dilute as to give a red solution no ozone is evolved.

BÖTTGER claims priority in the discovery of the above method of preparing ozone. He reccommends a mixture of two parts of dry hypermanganate of potash with three of sulphuric acid, and finds that the addition of peroxyd of barium is wholly unnecessary, as the mixture slowly evolves ozone at ordinary temperatures. Böttger finds this mixture one of the most powerful oxydizing agents yet known. Ether, alcohol and the etherial oils burst into flame when brought into contact with a mere trace, and flowers of sulphur are instantly converted into sulphuric acid, the action being attended by an explosive noise.—*Am. Journ. Sci. and Arts, Jan.* 1863, *from Journal für Prackt.., Chem.* B. 86, p 70 and 377.

Sodium Amalgam is best made in the following manner:—Place a small hard glass flask with a narrow neck nearly up to the mouth on sand in a sand-bath, kept at a temperature of about 300° F. Weigh out the mercury and sodium; put the former in the flask, and then add the sodium in pieces as large as a pea at a time, waiting for the action to cease, before adding a fresh lump. The sodium had better be dropped in with a pair of tongs, and the hand should have a cloth over it. At each addition of the sodium a slight explosion will be heard, and a bright flame will issue from the mouth of the flask. The action gets less violent as the mercury becomes richer in sodium. When the whole of the sodium has been added, pour the amalgam into a flat dish whilst still liquid, and when cold break

it up and preserve in a stoppered bottle. It will not require to be kept under naphtha. The amalgam forms a mass of long, needle-shaped, brilliantly-metallic crystals, which interlace in every direction, but have very little cohesion.—W. C. *Lond. Chem. News, Oct.* 25, 1862.

Manufacture of Saltpetre.—Saltpetre is obtained in the Mammoth Cave, Kentucky, and considerable quantities were obtained from this source during the war of 1812. It is derived chiefly from the excrements of bats, &c. Most of all the saltpetre which is employed for the manufacture of our gunpowder comes from India. It is not known whether any saltpetre is now obtained from natural sources in the Southern States. If the Secessionists were deprived of this substance entirely, they could not carry on a war. The nitrate of soda is very abundant in many parts of the world, and were it not so deliquescent, it would answer just as well for making gunpowder as nitrate of potash. The formation of natural saltpetre is a very slow process, requiring about two years to complete. During the French revolution 2000 tons were made in one year in Paris; and were foreign supplies cut off, twice this quantity could be made in the same space of time in the city of New York with its present number of inhabitants. In Sweden, each peasant who owns a house is bound by law to make a certain quantity of saltpetre every year for the use of the State. In Spain, Egypt, Persia, and especially India, vast quantities of this salt are made annually; and it is not only a source of great profit but of warlike power to Great Britain.—*Lond. Chem. News, Nov.* 8, 1862, *from Scientific American.*

Cork.—De la Production Naturelle et Artificielle du Liége dans le Chêne-Liége. par M. Casimir de Candolle. (Ext. from the Mém. Soc. Phys. et d'Hist. Nat., Genèv., vol, 1860), with three plates. This paper is interesting as the first botanical publication of the inheritor of this honored name in the third generation of botanists, and as an account of the formation and structure of cork in the Cork-oak, both in the natural state, and especially under the operation which has to be practiced in order to the production of cork of any commercial value. The operation consists in the removal from the trunk of the natural corky layer of the bark down to the subjacent cellular envelope or green layer; which is done in Algeria, (where young De Candolle's observations were made), during the summer or autumn. Shortly after this operation, a new corky stratum begins to form in the green layer, at a variable distance from its denuded surface. This grows by annual layers upon its internal face, just as the original and worthless corky layer did; but this is much finer and much more elastic, and is the commercial article. When this valuable cork has attained sufficient thickness, ordinarily after seven or eight years, it is also removed, with the same result as before, i. e., still another new corky

stratum is formed below; and so successive crops may be taken off the trunk every seventh or eighth year for a long while, or even indefinitely. —*Am. Journ. Science Arts, Sept.* 1862.

Cinchona succirubra.—Dr. Anderson, of the Calcutta Botanical Gardens, having succeeded in forming an infusion of the leaves of the cinchona succirubra from the plants of that species in the cinchona nursery, near Darjeeling, reports to Government that four cases of intermittent fever have been cured by it. The infusion thus possesses some of the febrifuge properties of cinchona. It is dark chocolate-color, and is intensely bitter.—*Lancet, Dec.* 6. *and Pharm. Jour.*

Editorial Department.

THE SALE OF ALCOHOL BY APOTHECARIES. DOES IT REQUIRE A LICENSE?—Until the Revenue Law gets to be fairly understood by those to whom its carrying out is delegated, dealers of all kinds will be more or less annoyed by misunderstandings with the officers. We know of no class of dealers that are more burdened and incommoded by the working of this law than are apothecaries and druggists. Recently, the apothecaries of Pittsburgh as a body, appealed. through the Assessor, to Commissioner Boutwell against their liability for assessment as liquor dealers, when the following reply was received:—

"Treasury Department, Office of Internal Revenue, Feburary 4th, 1863. Sir: Your letter of the 2d inst., relative to the liability of apothecaries and pharmaceutists to an assessment as retail dealers in liquors has been received.

"Decision No. 18 contains the ruling of this office on the question. The provision in decision No. 105, quoted by the apothecaries merely exempts certain preparations from the stamp duty imposed on proprietary medicines.

Very respectfully, GEORGE S. BOUTWELL."
Commissioner.

To Henry A. Weaver, Assessor 22d Dist., Penna.

"*Decision No.* 18. Alcohol or spirituous liquors of any kind can only be used by an apothecary in compounding medicines. When sold otherwise, he will be required to take out a license as a dealer. A license to wholesale dealers confers no authority upon the party holding such license to retail liquor."

On the other hand there is at least one of the assessors in this city who construes the law to exclude alcohol from the list of liquors confining the

meaning of the words to potable liquids, whether fermented or distilled; and in this we believe he is in harmony with the spirit of the law.

SECTION 64, Article 4, in reference to the license for retailing liquors, is as follows: "Retail dealers in liquors, including distilled spirits, fermented liquors, and wines of every description, shall pay twenty dollars for each license. Every person who shall sell or offer for sale such liquors in less quantities than three gallons at one time, to the same purchaser, shall be regarded as a retail dealer in liquors under this act. But this shall not authorize any *spirits, liquors, wines or malt liquors to be drank on the premises.*" Now is it not evident that the kind of distilled spirits which the license is intended to cover is *potable* spirits, such as whiskey, rum, brandy, etc., such, in fact, as our State laws cover, and which in their greatest stringency have never had reference to alcohol, which is chiefly sold by apothecaries to the public for fuel, for cleansing purposes, and for medicinal purposes. The apothecary is pre-eminently the proper custodian of alcohol for public use, from the fact that it always has been, and must continue to be, more intimately connected with his regular business than with that of any other class of dealers. One half of his medicines are either made by aid of alcohol as a solvent, or contain it as a constituent. Already have the tax on whiskey and other causes raised the price of this fluid from 50 cents to $1.30 per gallon by the barrel, an onerous burthen whence there is no escape. So far as we have been able to examine, the word *alcohol* does not occur in the law in any sense that can be construed to make it a taxable article. In Section 41, after enumerating how the duty on distillers of spirituous liquors shall be levied, it is said: "*Provided* that the duty on *spirituous liquors and all other spirituous beverages* enumerated in this act shall be collected," &c., &c. Is it not here clearly indicated that the expression "spirituous liquors" as used in the law is intended to mean drinkable liquids? and no one will class alcohol among these. We believe, therefore, that the decision No. 18 of Mr. Boutwell, wherein he uses the expression "alcohol or spirituous liquors of any kind" is not in accordance with the spirit of the law, and is a forced and unjust interpretation, which should be recalled. Speaking for ourselves, we are entirely ready to acquiesce in the law as it regards potable liquors sold *per se* by pharmaceutists, but we do most earnestly protest against the necessity of an apothecary, who pays the Government a license for permission to conduct his business, being compelled to take out a liquor license because he retails alcohol for medicinal or domestic purposes.

Since the above has been in type we are pleased to hear that Congress, in Committee of the Whole on amendments to the Tax Bill, has adopted the following addition to paragraph 28, of section 64th, viz.: "Nor shall apothecaries who have taken out a license as such be required to take out a license as retail dealers in liquors, in consequence of selling alcohol." Should this be finally adopted, as we presume it will be, it settles this portion of the vexed question.

First Outlines of a Dictionary of Solubilities of Chemical Substances. By Frank H. Storer. One volume in three parts, part I, Cambridge, Mass. Sever and Francis, 1863, pp. 232, royal octavo, double column.

We are indebted to the publishers at Cambridge, through J. B. Lippincott & Co., of Philadelphia, for the commencement of this valuable work, which was referred to in our July number. The book was received so near the time of our going to press that it will be impossible, in this notice, to enter as fully into the merits of the work as we hope to do on a future occasion. The author conceived the idea of his work whilst attending lectures at Paris, in 1856, owing to the need of a body of information in relation to the solubilities of salts, which further reflection determined him to extend to a regular dictionary of solubilities of all Chemical Substances, as far as they have been examined. At the beginning, the author prepared an alphabetical list of substances and their solubilities, from the standard works, intending to fill in the details from original memoirs until the leading chemical publications of this century had been searched and digested; but the great bulk of the manuscript, and its complexity from interpolation, presented so formidable a difficulty that he determined to print it in the present form, under the title of Outlines, leaving, to a future edition, the labor of perfecting many of the details. The author, in his prefatory remarks, declines all discussion of the philosophy of solution, as irrelevant in a dictionary of this kind, but defines what limits he proposes to himself in respect to solvents: "Thus, though in the term "solubility of substance," we ordinarily include only the comportment of the substance towards water, alcohol, wood-spirit, ether, oil of turpentine, benzin and analogous hydrocarbons, and other 'neutral solvents,' it is obviously, sometimes, proper to add observations on the action of acids and alkalies," etc.

In regard to the methods of effecting solutions which have so marked an influence on results, our author does not deem it apposite to enter into much detail; referring to Frezenius and other hand-books of analysis for directions; yet he points out the importance of knowing whether the solubility has been determined by digestion at the ordinary temperature; or by cooling from a hot saturated solution, and prefers the former method as less liable to give variable results. He refers to the difficulty arising out of super saturation, and the necessity of time and equality of temperature in making experiments. This is apparent to every observing apothecary in numerous instances. A saturated solution of sugar, by a change of temperature, commences to crystallize, when the process thus started will proceed beyond the point of saturation and weaken the solution. Again, in the solution of complex substances, so frequent in pharmacy, nothing is more common than for substances to be dissolved readily at first, which again precipitate on standing from apparent mutual interference, as in the action of weak alcohol on cinchona bark, the cinchonic red at first,

abundantly taken up, commences to precipitate very soon after. So important do we deem the subject of the influences which control solubility, that we would earnestly encourage the author, should the opportunity offer in a future edition, to give an introductory chapter relative to the several normal solvents, the influence of purity or strength on their power; the methods of applying them, grouping analagous cases, and specifying important instances of variation. For instance, one author will state the solubility of a substance in ether and alcohol, and give no statement of their strength, using, perhaps, alcoholic ether, or hydrated alcohol, and the next experimenter presuming that the pure solvents have been employed, gets with these different results.

In regard to nomenclature the author necessarily has had to contend with a formidable difficulty, and has had to exercise his judgment with much care in determining names and synonyms. We are sorry to find that he has not adopted the termination "*ia*" or "*a*," for the organic alkaloids, to distinguish them from neutral substances, which terminates in *in*, and it is not quite satisfactory to us that he has adopted the centigrade scale for temperature, in a work addressed to English and American readers more especially, yet the idea may be to urge the adoption of this scale parallel with decimal weights in all scientific records.

In glancing over the text, the reader is at once struck with the comprehensiveness of the plan of the work, not only in regard to rare and isolated substances, organic and inorganic, but to groups of salts of acids, even the names of which are not always met with in ordinary works; for instance, the solubility of 30 salts of cinnamic acid and 22 salts of chrysammic acid are noted, whilst antiarin, asbolin, bixin, cantharidin, catechin, carotin, casein, cellulose, etc., come in for due notice. On the other hand important bodies like acetic, arsenious and carbonic acids, with their groups of salts, are described very fully, more than twenty-two pages being devoted to the carbonates, of which, at least 144 are noticed. We observe that important salts like carbonates of potassa, soda, baryta, magnesia, zinc, strontia, etc., are examined in detail, a large number of observations being brought together, and references to original papers interspersed. The type, though small is clear, and the paper good. If the work is finished in the same manner as it has been begun, it will be exceedingly valuable to practical as well as to theoretical chemists, and the apothecary and the manufacturing chemist will find its pages stored with information needed on numerous occasions, and which here is presented to them in the most accessible form. We cannot conclude our notice better than by extracting a single item which will convey a better idea of the style of the work:

BENZOIC ACID. $C_{14}H_6O_4 = C_{14}H_5O_3,HO$ Soluble in 607 pts. of water at 0°. (Kolbe & Lautemann, *Ann. Ch. u. Pharm.*, 115. 187. [K.].) Soluble in 480 pts. of cold water (Lichtenstein); in 200 pts. of water at 18.75°, and in 24.5 pts. at boiling (Bucholz

Gehlen's Journ. für Ch. Phys. u. Min., 1810, 9. pp. 340, 355); in 500 pts. of cold water (Dörffurt, Bergman); in 24 pts. of boiling water (Dörffurt, Lichtenstein, Bergman); in 400 pts. of cold water (?); in 30 pts. of boiling water (Trommsdorff); in 160 pts. of water at 18.75° (Abl, from *Oesterr. Zeitschrift, für Pharm.*, 8. 201, in Canstatt's *Jahresbericht, für* 1854, p. 75). 100 pts. of water at 15.5° dissolve 0.208 pt. of it. 100 pts. of water at 100° dissolve 4.17 pts. of it. (Ure's *Dict.*) 100 pts. of the aqueous solution saturated at the ordinary temperature contain 0.5 pt. of it, and 3.25 pts. when saturated at 100°. Readily soluble in water containing 1.5 pts. of phosphate of soda, or 4 pts. of sulphate of soda. (Ure.) Soluble in 1.79 pts. of absolute alcohol at 18.75°, and in rather more than 1 pt. at the temperature of boiling. (Bucholz, *Gehlen's Journ. für. Ch. Phys. u. Min.*, 1810, 9. pp. 342, 355.) Abundantly soluble in alcohol, from which it is precipitated on the addition of water. (Lichtenstein.) Soluble in 1 pt. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 302 [T.].) 100 pts. of cold absolute alcohol dissolve scarcely 56 pts. of it. (Bucholz, cited by Wenzel, *loc. cit.*) Soluble in 25 pts. of ether, either hot or cold. (Bucholz.) 100 pts. of oil of turpentine dissolve 0.4 pt. of it; and at 100° more than their own weight, the acid crystallizing out on cooling. (Lecanu & Serbat.) Readily soluble in fixed and volatile oils, and in benzoic ether.

Soluble in benzin and the other light coal-naphthas. (De la Rue.) Largely soluble in hot caoutchin, a portion crystallizing out again on cooling. (Himly.) Soluble in creosote. (Reichenbach.) Soluble, without decomposition, in cold concentrated sulphuric acid, from which solution water precipitates it. (Lichtenstein.) Also soluble in nitric acid and sulphurous acid. Insoluble in chlorhydric or phosphoric acids. Hot acetic acid dissolves it precisely as water does, but it crystallizes out again when the acid cools. (Lichtenstein.)

Most benzoates are soluble in water; many of them being readily soluble. Many are soluble also in alcohol. The more sparingly soluble benzoates dissolve readily in aqueous solutions of acetate of soda, or of acetate of lead, and of nitrate of soda; but they do not dissolve in solutions of nitrate of potash, or of sulphate of soda, or chloride of sodium. (Lecanu & Serbat.)

Report of the Commissioner of Patents for the year 1861, *Agriculture*, Washington; Government Printing Office, 1862. Ex. Doc. No. 39, 37th Congress, 2d Session—Senate, pp. 654, oct.

Our acknowledgments are due to J. W. Forney, Esq., Secretary of the U. S. Senate, for a copy of the Agricultural Report of the Patent Office, last issued. The plan of printing the Agricultural portion of the Report, in a separate form, is a great improvement on the old way of mingling all the Reports in one volume. Among the items in the Report most prominent are the history, industry, and commerce of flax, by D. J. Browne, of the Patent Office; on the culture and manufacture of flax and hemp, by O. S. Leavitt; on sheep-raising and wool-growing, by W. S. Colohan; on artificial manures, by Prof. C. Upham Sheppard, of Charleston, S. C.; on raspberry culture, by J. A. Warder; on strawberries, by the same, and W. R. Prince; on the consumption of milk, by Silas L. Loomis, M. D.; on the destruction of noxious insects; on the pear orchard; on Indian corn; on sorghum culture and sugar-making, and on the grape culture and wine-

making. The work, if extensively distributed, must have a beneficial influence by exhibiting to the farmers in general what results some of their number have obtained. It would be worth the attention of Mr. Browne, or some other gentleman of the Patent Office, to give a glance at the culture of medicinal plants and the collection of indigenous drugs as a part of the aggregate productions of this country, and the several communities of Shakers who devote time to this object, and the systematic gathering of wild medicinal plants in the great West, of which Cincinnati is the focus, are the chief points to which the inquiry should be directed. Again, it is suggested that the department institute an inquiry in regard to the possible collection of *argols* or *tartar* in our several wine regions. The immence advance in tartaric acid and all tartrates, owing to the scarcity of tartar, is patent to every druggist and consumer of cream of tartar.

OBITUARY.—Since our last issue, death has removed one who was intimately connected with our profession.

We allude to the sad yet glorious death of ADOLPH G. ROSENGARTEN, at the battle of Murfreesboro', Tennessee, on the 29th of December last, just as he had completed his 24th year. His earliest connection with our profession was about eight years ago, in the retail drug business, to familiarize himself with the appearance and physical properties of drugs, under the direction of the writer of this notice; after which, he went to Europe, where he remained about three years, engaged in the study of his profession. Immediately upon his return he took an active part in the manufacturing laboratory of his father and brothers in this city, and the success which attended his efforts there fully attested the industry and enthusiasm with which his studies while abroad had been prosecuted.

In the summer of 1861, he joined the Anderson Troop as a private; before they moved from Carlisle he was made orderly sergeant, then a lieutenant, and after the troop was recruited to a regiment, he was made senior major. His promotion gave great satisfaction to all under him, as well as to those in whose commands he had served. Thorough in everything, he was especially so in his military duties, and sad to all who were acquainted with him was the announcement of his death; he fell almost within the lines of the enemy, with twelve bullets in his body. So closed the life of one, who at the early age of 24 had given such rare promise of distinguished ability in the quiet walks of practical science, as well as in the stern duties of a soldier's life.

In his friendship he was warm and sincere, and though manly, so refined was his demeanor at all times, that the most polite ear could take no exception to any remark that might escape his lips. Admired as he was by a large circle of friends, his home was the place where the beauty of his character was most fully seen, and there will he be mourned and missed when others attached to him by the warm ties of friendship shall have lost their sorrows in contemplating the beauty of his character. T. S. W.